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ON  
THE NATURAL BUILDING AND ORNAMENTAL  
STONES OF SWEDEN

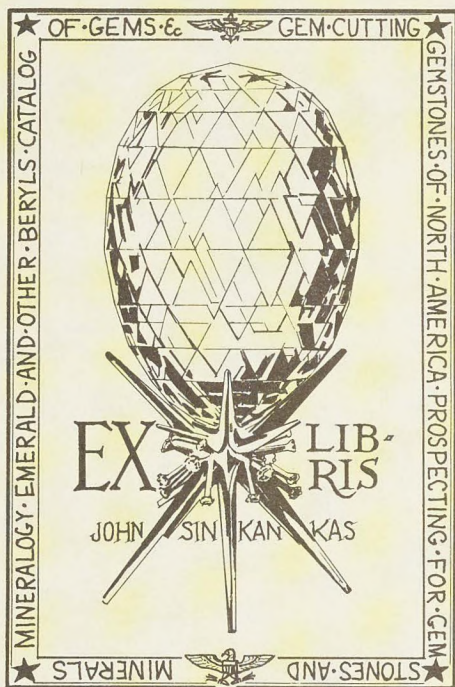
TOGETHER WITH  
A LIST OF THE LEADING SWEDISH FIRMS ENGAGED  
IN THE STONE INDUSTRY

BY  
HERMAN HEDSTRÖM

(WITH 14 PLATES AND 1 MAP)

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STOCKHOLM  
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER  
1909



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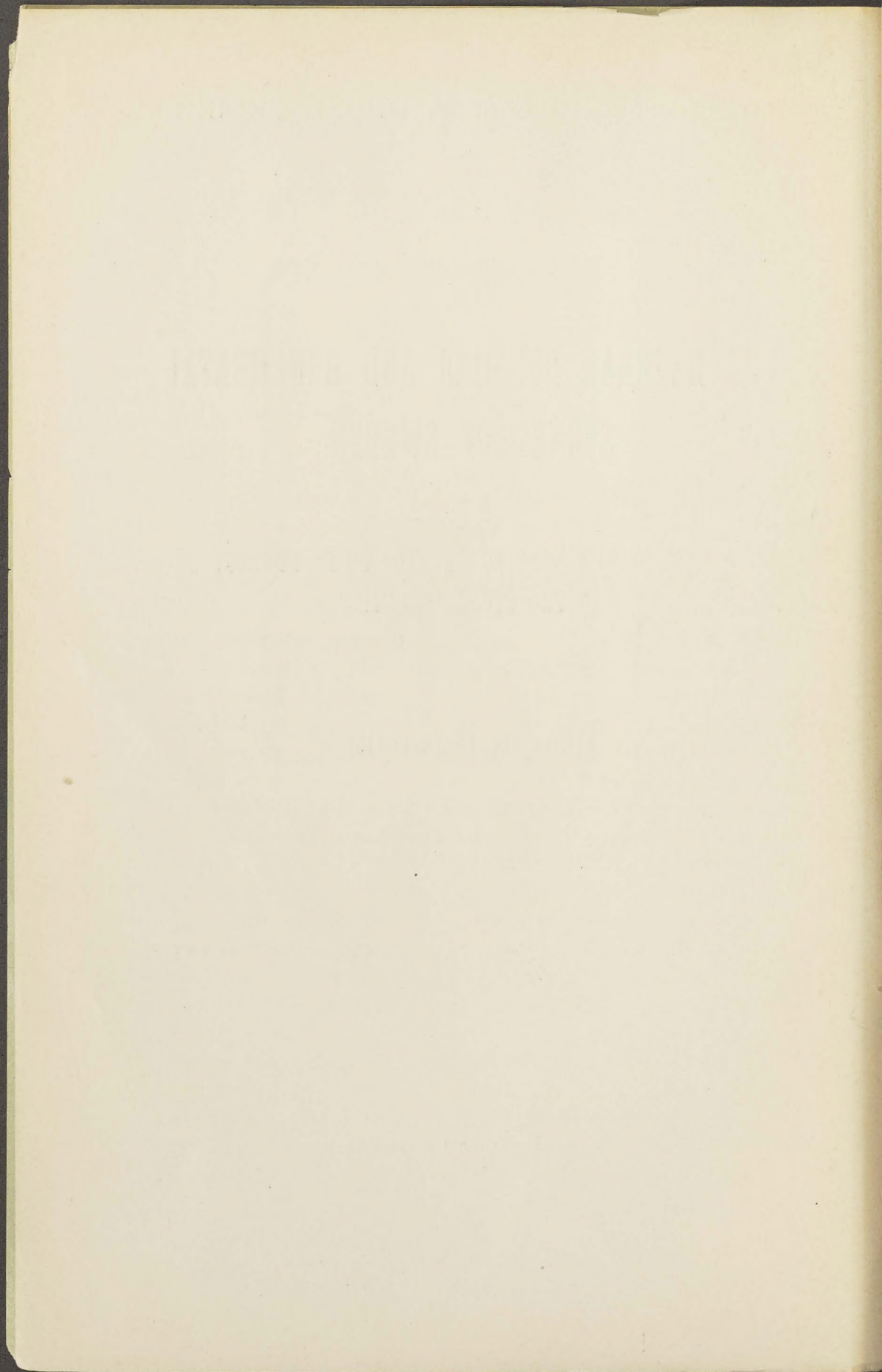
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## Preface.

The industry the object of which is the exploitation of the natural stones has, during the last decades, undergone a well-nigh uninterrupted development in Sweden. An account of this industry under the title of »*Några upplysningar om Sveriges stenindustri*» was published in connection with the exhibition of Swedish rocks, etc. which was arranged by »Sveriges Geologiska Undersökning» (Geological Survey of Sweden) at the »Nordiska Industriutställningen» in Copenhagen in the year 1888, and this treatise was published in a new revised edition in the year 1891 on the occasion of the Exhibition in Gothenburg. The author of these works is HJALMAR LUNDBOHRM, at that time geologist to »Sveriges Geologiska Undersökning», who had made this branch of geology his speciality, and in a number of papers, most of which are now out of print, had furnished valuable information and brought forward interesting proposals in questions, connected with the stone industry.

About the year 1899, when the main programme of »Sveriges Geologiska Undersökning» took a new direction, almost all touch was lost between the latter institution and the firms engaged in the Swedish stone industry, and the gulf was widened still further, when LUNDBOHRM in 1902 gave up his position there.

In the explanations, appended to the geological maps, issued from that date up to the present day, there are, to be sure, more or less brief accounts given of the stone industry, carried on within the respective districts, but the work

had not been put under the direction of a specialist, who could devote himself to it exclusively and follow its gradual progress.

When the present director of »Sveriges Geologiska Undersökning», Prof. J. G. ANDERSSON, commissioned me to furnish a brief survey and account of the Swedish stone industry, some necessary preliminaries were to re-establish the connection with the representatives of the industry. To this end a circular was sent in 1906 to all the Swedish firms, engaged in the stone industry, soliciting information regarding a number of points on which elucidation was required for the work in hand.

The result of this request, however, did not answer the expectations, though the institution is under obligation to a number of firms for ready information, and for specimens of rocks — some of them polished — presented to the museum.

In order to test what could be effected in separate cases by the here employed autotype process on stone in different colours, the rocks, represented in plates 1—8, have been selected with a view to bringing together those differing as much as possible in composition and variety of colour. As the plates show, the mode of reproduction has, on the whole, proved satisfactory, and thus, in spite of its expensiveness, there is every prospect of it becoming the method inevitably resorted to in similar cases.

Stockholm, Sept. 1908.

Herman Hedström.

## Short Historical Survey and Statistics.

The natural stones, first applied in Sweden to building and ornamental purposes, were, of course, those which could be turned to account with the least trouble and expense, in other words, those which were more loose and accordingly easier to quarry and dress. The stratified Cambrian-Silurian limestones, and, to some extent, the sandstones as well, have thus been quarried ever since the Middle Ages, or in more precise terms, since the 12th and 13th centuries, and were used for the outer and inner wall linings and ornamentation of the great public edifices of those times, such as churches and castles, etc., as well as for the basements, walls, steps and landings of private houses.

This application was, however, in a great measure confined to the districts, where the Cambrian-Silurian formation is found, viz Scania (Skåne), Östergötland, Västergötland, Närke, Öland, and particularly Gothland (Gottland), where the numerous churches and other buildings bear witness to the high level of craftsmanship, attained by the stone-cutters of those days.

It should, however, be mentioned that even during these early days limestone was exported to the districts round about and to foreign countries. This was particularly the case with the limestone from Gothland and Öland — which stone is said to have been shipped in ancient times as far as to England — the maritime position of these districts rendering the transport comparatively cheap.

Among the harder kinds of Swedish rocks, the crystalline Archean rocks, those which were the first to be systematically worked were the green marble from Kolmården

in Östergötland and the porphyries from Elfdalen in Dalecarlia (Dalarne) of which a number of ornamental and decorative objects were fashioned. The marble quarry of Kolmården was opened as early as the middle of the 17th century, and the porphyry-works of Elfdalen were completed in 1778.

It was not till a later period that the granites and gneisses of Sweden come into more *general* use for purposes of the stone industry. These rocks had, it is true, been employed at quite an early date, in certain building operations of a more extensive nature, such as the castle of Stockholm, the docks and wharves at Karlskrona, etc., but they were not systematically exploited until the middle of the 19th century, a date which marks the commencement of the rise of the Swedish stone industry.

How, from this time, it developed and grew into an industry of great national importance, is eloquently shown by the following table, taken from the yearly reports of »Kungl. Kommerskollegium» (the Board of Trade).

*Quarries and Stone-Yards.*

Year.	Number of works.	Number of workmen.	Value of Production in kronor. <sup>1</sup>
1861 . . . . .	2	5	1,050
1862 . . . . .	—	—	—
1863 . . . . .	2	6	4,293
1864 . . . . .	4	13	9,667
1865 . . . . .	4	211	100,926
1866 . . . . .	4	212	71,435
1867 . . . . .	5	154	52,890
1868 . . . . .	7	256	83,968
1869 . . . . .	5	323	79,000
1870 . . . . .	6	314	92,130
1871 . . . . .	8	447	187,144
1872 . . . . .	11	902	224,530
1873 . . . . .	12	805	380,061
1874 . . . . .	14	820	452,525

<sup>1</sup> 18 kr. = 1 £.

Year.	Number of works.	Number of workmen.	Value of Pro- duction in kronor.
1875 . . . . .	16	998	444,096
1876 . . . . .	22	1,226	567,137
1877 . . . . .	29	1,358	643,757
1878 . . . . .	26	1,414	738,993
1879 . . . . .	25	1,482	628,759
1880 . . . . .	22	1,737	641,300
1881 . . . . .	18	1,319	519,858
1882 . . . . .	22	980	511,670
1883 . . . . .	23	1,054	608,881
1884 . . . . .	26	1,641	765,700
1885 . . . . .	26	1,355	763,458
1886 . . . . .	28	1,841	986,820
1887 . . . . .	40	2,510	1,030,368
1888 . . . . .	49	2,455	1,105,915
1889 . . . . .	52	2,311	1,234,091
1890 . . . . .	43	1,912	1,213,385
1891 . . . . .	86	3,867	2,568,565
1892 . . . . .	87	4,693	2,925,466
1893 . . . . .	102	5,030	3,165,310
1894 . . . . .	123	5,817	3,728,679
1895 . . . . .	124	6,379	4,411,114
1896 . . . . .	196	8,227	6,037,788
1897 . . . . .	189	8,713	7,220,818
1898 . . . . .	206	10,058	8,748,022
1899 . . . . .	226	11,047	10,653,263
1900 . . . . .	228	11,697	11,063,288
1901 . . . . .	229	11,646	11,216,982
1902 . . . . .	226	11,775	13,091,800
1903 . . . . .	257	11,422	11,859,494
1904 . . . . .	273	11,388	12,081,246
1905 . . . . .	299	12,346	13,646,876
1906 . . . . .	300	11,985	14,051,614

This magnificent development is partly due to an increased use of natural stones within Sweden itself, but the main cause is the fact that these stones have been worked into the foreign market and have found an ever

increasing sale there. At the present moment Sweden must be regarded as one of the leading countries in granite export, and the value of our stone export, if we make due allowance for fluctuations in trade and the unsettled condition of the customs tariff, shows, on the whole, a fairly steady increase. The following table, illustrating our stone export during recent years, has been taken from the annual reports of the Board of Trade.

Year.	Germany.	England.	Denmark.	Russia.	Other countries.	Total in kronor.
1890 . . . . .	2,603,029	278,803	597,365	83,005	122,066	3,684,268
1891 . . . . .	3,095,298	244,910	805,417	209,646	163,235	4,518,506
1892 . . . . .	3,339,281	329,184	853,171	95,002	123,956	4,800,594
1893 . . . . .	3,708,397	352,011	514,163	89,591	177,841	4,842,003
1894 . . . . .	4,235,393	249,009	578,582	57,775	154,386	5,275,145
1895 . . . . .	4,299,328	273,825	376,238	94,365	217,364	5,261,120
1896 . . . . .	4,515,577	347,725	700,355	146,280	211,479	5,921,416
1897 . . . . .	5,657,894	517,914	885,759	198,328	371,232	7,631,127
1898 . . . . .	6,514,456	742,494	1,015,619	294,778	268,712	8,836,059
1899 . . . . .	7,185,430	912,029	1,083,163	255,182	252,525	9,688,329
1900 . . . . .	7,553,249	855,961	1,402,764	267,231	308,183	10,387,388
1901 . . . . .	6,307,891	1,875,664	1,372,124	158,735	423,611	10,138,025
1902 . . . . .	6,777,971	1,983,450	1,164,804	168,284	503,927	10,598,436
1903 . . . . .	7,313,750	1,481,814	1,038,602	233,018	590,624	10,657,808
1904 . . . . .	6,864,572	1,561,730	1,008,313	95,252	753,455	10,283,322
1905 . . . . .	9,333,163	1,135,561	1,122,267	67,298	1,206,054	12,864,343
1906 . . . . .	8,186,078	1,125,960	1,280,524	62,100	955,094	11,609,756

The above tables include stones which can, properly speaking, not be designated as »building and ornamental», such as grindstones, millstones and curbstones, etc. Moreover, the tables embrace all kinds of unhewn stones, also such unhewn stones, as limestone and dolomite, which are used for chemical and metallurgical purposes. As these latter stones are lumped together with others in the present statistics, it is impossible to obtain statistics, embracing only the building and ornamental stone industry. The statistics are, moreover, unsatisfactory in other respects as well, and it is to

be desired that the statistics of the stone and mineral industry of Sweden should, as is the case in many foreign countries, be placed in the hands of experts. Notwithstanding, the figures given may be regarded as holding good in the main of the subject here treated, especially as the building and ornamental stone industry forms by far the most important part of our stone industry, when this term is taken in its most comprehensive meaning.

### On the chief rocks of Sweden from the point of view of the Stone Industry.

The accompanying sketch-map shows the chief Swedish stone industry districts, and, following that map, a brief description will now be given of the rocks which occur in them.

**Granites and Gneisses** are closely related to one another in nature and application and therefore may conveniently be treated under one head. These rocks, as will be seen from the geological map of Sweden, form the main mass of the ground of that country. However, it is, generally speaking, only those granites and gneisses, near the coast, which have been exploited, this being due to the cheaper and more convenient communications and freights, but supposing lower railway freights were introduced in the form of export tariffs, a considerable quantity of the best granites and gneisses from the interior could be turned to account.

It will be found most convenient in such a brief report of the granites and gneisses which are at present being quarried and dressed, to follow along the coast-line, starting from the Norwegian frontier.

The most important and largest granite district — from our point of view — in Sweden is the *Bohuslän* district which extends from the Norwegian frontier at Iddefjorden in the north to Lysekil at Gullmarfjorden in the south.

The whole of this district, to be sure, belongs to a fairly homogeneous granite-massive-body, but it is obvious that the appearance and structure of the granite in different parts of such a large area presents considerable divergences in colour, grain, etc. The rocks, moreover, have been given, in different places, different local names: thus to give a few examples, Malmön granite for close-grained, grey and greyish-yellow kinds from Malmön off Lysekil, Strömstad and Hunnebostrand granite for medium-grained grey to red varieties from the districts of Strömstad and Hunnebostrand, Stångehufvud or Lysekil granite for the usually coarse-grained and red varieties, which are found at Stångehufvud near Lysekil, and on some islands south of it. If we except the last-named granite which shows a sharp contact with the fine-grained sort in the neighbourhood, no clearly defined boundaries are to be found in the field between the varieties, but a gradual transition, whence they can be banded together under the common name, *Bohuslän granite*, while the term *Stångehufvud* or *Lysekil granite* is reserved for the last-named kind.

The Bohuslän granite may thus either be fine- or medium-grained, greyish-blue or grey in colour — sometimes with a tinge of yellow — or else pink or more rarely red. It is composed of quartz, smoky-grey or smoky-brown in colour, light, grey, pink or red felspar and black mica. The reproduction of the granites from Svenneby, Rabbalsheide and Malmön in plates 3, 4, and 5 are typical examples of the different appearance and nature of the Bohuslän granite in different localities. The reproduction of Malmön granite has, however, not been entirely successful.

The Stångehufvud granite is coarse-grained, of a red colour and consists of a flesh-coloured and greenish felspar with dark mica, just as is the case with the Bohuslän granite the quartz has a characteristic smoky-grey hue.

Because of its regular joints and its well-developed cleavage seams the *Bohuslän granite* is an excellent rough

material for building and ornamental purpose, and it is particularly adapted for sets, curbs and scantlings.

During the last few years *Skandinaviska Granitaktiebolaget* at Halmstad has commenced using stone-splitting machines for the working of what are known as »smågatsten» (German »Kleinpflaster»), or small paving stones, and have acquired the sole right to use these patented machines. These stones are now being worked, among other places, at Rixö in Bohuslän, and the worked stone has proved to possess a number of advantages as compared with macadam.

The accompanying reproduction (plate 9) from one of the quarries of the *Granitaktiebolaget C. A. Kullgren's Änka* in Malmön admirably illustrates the uniform and marked joints, and similar examples can be found in other granite quarries within the district.

The Bohuslän granite is worked by a large number of firms in numerous quarries which are scattered over almost the whole area of the granite distribution. The chief among these quarries will be enumerated in connection with the list of firms which will be found in the sequel. The great majority of these firms works mainly stone for street-pavements, quays, bridges and docks, but the granite has also been used for house-building and ornamental purposes and in recent times also for sculptured sepulchral monuments.

Among important works made of Bohuslän granite we may mention the following:

From *Granitaktiebolaget C. A. Kullgren's Änka*, Uddevalla:

1) Of *grey granite from Malmön*: granite for Trollhätte locks (1842 and following years); pedestals of the statue »Moses and David» in Vor Frue Church in Copenhagen (1859); abutments and copings to piers at Gothenburg (1861); stretchers, headers and copings for the maritime forts of Copenhagen (1861 and following years); complete outer and inner wall linings of the Viborg Cathedral (1863 and following years); quay wall-stones for the Thames Embankment in London (1864 and following years); basement, vault and porch stones for the townhall of Malmö (1865); granite for the Brockthor locks at Hamburg (1868); door-cases, steps, cornices and tower galleries, etc. for Lund Cathedral (1869 and following years); monument to Sven Renström, Gothenburg (1871);

pedestal of Thorwaldsen's monument, Iceland (1875); pedestal of the Warrior Monument in Hamburg and granite for the harbour pier at Malmö (1876); granite for the pivot-bridge over the Magdeburger Hafen, Hamburg (1886); steps and 22 columns for Allhelgonakyrkan (All Saints Church) at Lund (1887); abutments, etc. of the piers in the freeport of Hamburg; wall linings for three stories and roof cornice of the Skandia Insurance Company's house in Stockholm and porch of the Svea Insurance Company's new building at Gothenburg (1888); socle, pillar-socles and steps of the Oscar Fredrik Church at Gothenburg (1889); monument to Albert Lindhagen (1890) and Lars Johan Hierta (1891), Stockholm; wall linings for the new building of »Göteborgs Köpmansbank» (1891); 10 pilasters for the Glyptotek, Copenhagen (1892); John Ericssons mortuary chapel at Filipstad and granite for the Rijn harbour, Rotterdam (1894); pedestal of Charles X Gustavus' equestrian statue at Malmö and the Warrior Monument to Duncker and Aerekoff at Umeå (1896); sepulchral monument to the »Västmanland—Dala nation» at Uppsala, and hewn granite for the Billwärder locks (about 1,400 cub. m.), Hamburg (1898); monument to Beijer, the Director General, at Malmö (1899); the facade of the central house of the Ny Carlsberg building, Copenhagen, and pedestal of Stenbocks equestrian statue at Hälsingborg (1900); 10 large polished pillars for the bank-hall in the building of »Sveriges Riksbank», Stockholm, and granite for the staircase to Kärnan, Hälsingborg (1902); facade of »Stockholms Handelsbank» and the building of the Skåne Fire and Life Insurance Company at Malmö and monument to Lennart Torstenson (granite sculpture), Fröskog (1903); polished pillars in the foyer of »Dramatiska teatern», Stockholm; porch and building fronts for the Public school at Kungsholmen, Stockholm, socle and building fronts for the house of the Swedish Medical Society at Stockholm and facade of »Göteborgs Handelsbank».

2) Of *red granite from Bovallstrand*: land-abutments for the Kuhwärder harbour, Hamburg (1898); building fronts for the ground floor of Neues Verwaltungsgebäude, Stettin (1900); granite for the Boltenhof, Hamburg, for the Wartehallengebäude, Cuxhaven (1901) and facade-stones for the first story, as well as the roof cornice of the building of the Uddevalla Savings-bank.

From *Aktiebolaget H. L. Liepe & Son*, Gothenburg: stone supplied to »Göteborgs Högskola», Kungsportsbron, etc. Gothenburg; the mausoleums built in honour of Viktor Rydberg and Aug. Röhss at Gothenburg, and polished works for »Nya Glyptoteket», Copenhagen.

From *Karl O. Mattson*, Hunnebostrand: stone supplied to the lower part of the new building of the Skåne Insurance Company at Malmö, the Trollhätte power station, Trollhättan, and to docks and piers at Devonport, Chatham, Grangemouth, Grimsby, Simmons Bay, as well as the Tyne bridge.

*J. & A. Nielsen*, Gothenburg, have furnished stone for the following works in the building line: the building of »Kreditföreningen» and the Custom-house, Aalborg, the Custom-house, Odense, the slaughter-house and Central prison as well as several private houses at Gothenburg, the viaduct works for the railway station, part of »Knippelsbron» and a number of

private works in Copenhagen, the market-hall, Lübeck, the basement of the Realschule at Flensburg, the Naval station, Mürvig, etc.

*Skandinaviska Granitaktiebolaget* at Halmstad has supplied stone from *Hunnebostrand granite* for the building of »Aktiebolaget Marcus Holmquist», Halmstad, for the »Realskola» and the slaughter-house at Malmö, (in the last-named building also all the stone, required for the pavements), the building of »Spritbolaget», Trelleborg, the Stadt Theatre, Kiel, and the new building of the Trygg Insurance Company, Stockholm.

The *Stångehufvud granite*, by reason of its coarse grain, is not adapted for paving stones and scantlings, but it is an excellent raw material, particularly for monuments, etc. and has been exported in the form of rough blocks in large masses to foreign countries to be worked there. The *Stångehufvud* stone-works were formerly the property of the firm *Kessel & Röhl* of Berlin, but have now been taken over by the *Uddevalla Mekaniska Stenhuggeri och Sliperi, Hebbel and Co.*

From *Stångehufvud* a number of large works of granite have been supplied, such as pedestals to the following monuments: the Warrior Monument at Schwerin (1874), the King Frederic William Monument at Cologne, the Victory Monument at Dresden, the Fritz Reuter Monument at Jena, the Henoch Monument at Berlin, the Semper Monument at Dresden, the Hoffman v. Fallersleben Monument on Heligoland, the Schultze-Delitzsch Monument at Berlin, the Bismarck Monument at Chemnitz, the Moltke Monument at the same town, the Grand Duke Ludvig Monument at Darmstadt, and the Emperor William I Monuments at Siegen, Dortmund, Ems, Schöneberg (Berlin), Altenburg, Arolsen, Chemnitz and Hamburg; further there have been exported from here architectural parts for the Washington Monument at Philadelphia and the Luther Monument at Berlin, granite ashlar for the bridge across the Emperor William Canal at Lewensau, »Kungssportbron» at Gothenburg, the railway bridge across the Nordre River (from Kungälf to Ytterby) and, finally, about 5,000 cubic metres of front-stone for the Vasa Church at Gothenburg (1905).

South of the Bohuslän granite district on *Kälkerön* off Mollösund in Bohuslän has been quarried a beautiful red and coarse-grained porphyritic gneiss which has been fashioned into polished pieces of work for houses, sepulchral monuments, as well as smaller ornaments, such as stick-knobs, etc.

Along the *coast of Halland* the prevailing rock is *gneiss* of a grey or red colour and usually fine-grained. It is worked in a number of quarries — in the districts of Varberg and Falkenberg as well as at Steninge, Guldbrandstorp, and Söndrum, in the vicinity of Halmstad — on a great scale for street pavements, quays and bridges, but also for other building purposes for which a somewhat coarse-grained, red gneiss from Söndrums stone-works is used.

Among more pretentious works, where these stones have been employed, we may mention: the harbour-works at Kiel and Halmstad as well as the barracks and cavalry stables in Schleswig-Holstein. *Skandinaviska Granit-aktiebolaget* at Halmstad has, moreover, supplied *Söndrum gneiss* for a large number of works for building among which the following may be mentioned: the New High School, the New Elementary School and the Grand Hotel, Halmstad; the Skåne Bank, the Town Hall, and the Savings-bank, Hälsingborg; »Aktiebolaget Göteborgs Bank's» branch office at Falkenberg; the Freemasons' Lodge, the Electric Works and two market-halls at Malmö (the latter executed in rubble); the Commerce and Discount Bank at Kiel; the base of the Absalon statue in Copenhagen; Major Holmberg's and Burgomaster Ahlström's sepulchral monuments at Malmö.

Stones, closely related to these Halland gneisses, are also quarried in Scania at *Torekov*, in *Hallands Väderö*, and the right of quarrying the fine-grained grey »iron-gneiss» of *Torpa klint* has recently been acquired by *Aktiebolaget Övedsklosters Sandstensbrott*. These stones are adapted not only for paving stones and scantlings and other building stones, but also for macadam pavements with a market not only in Scania but also in the larger towns of Denmark and Germany.

At Varberg we find a rock, the so-called »Varberg Granite», a pyroxene gneiss or diallage-amphibolite which in virtue of its pretty green colour has been largely employed for sepulchral monuments as well as for outer and inner wall linings. Its appearance is reproduced in plate 5. As, however, its green colour has proved incapable of withstanding the effects of atmospheric influence and in the course of time passes into yellowish-green and other ugly shades, it does not appear to be adapted for outer architecture and monuments. On the other hand it ought to

prove serviceable in a sawn and polished state for table slabs and inner wall linings, and as such to compete, in a manner, with the serpentine and the serpentine-containing marbles. It is exported as unhewn stones to Germany and England, where it undergoes dressing.

Among more important works made of Varberg granite the following for which the firm *Kessel & Röhl* supplied the stone are deserving of mention: the Washington Monument at Philadelphia, the inscription plate for the Warrior Monument at Siegen, the Frederic the Great Monument at Siegen, the Luther Monument at Eisleben, the Wilms Monument on Marianne Square in Berlin and the Victory Monument at Leipzig.

The Varberg granite is at present being worked by *Granitaktiebolaget C. A. Kullgren's Ånka* and *Svenska Granitindustriaktiebolaget*.

A stone closely related to the Varberg granite, but of a dark-green, almost black-green colour, is quarried at *Ekeröd* in the north of Scania for export in blocks by *Skandinaviska Granitaktiebolaget* at Halmstad.

The *Ekeröd stone* has been used for building fronts of »Rexhaus» at Berlin (polished); for the mountings of the Royal Marstall at Belgrade; the Engelbrekt Monument at Norberg and the building fronts of a hotel at Jungfernstieg, Hamburg.

In the north-east of *Scania* the beautiful high-red *Vånga* or *Oppmanna granite*, found in the Oppmanna Hill, N. W. of Sölvesborg, has lately come into use. *Skandinaviska Granitaktiebolaget* at Halmstad and *Svenska Granitindustriaktiebolaget* have opened quarries for the export of unhewn stones. The stone is composed of high-red felspar, sometimes inclining to brown, dark, but little prominent mica and smoke-coloured or greyish-brown quartz. It has a grain, ranging from medium- to coarse-grained, and is a somewhat cataclastically transformed granite.

*Skandinaviska Granitaktiebolaget* at Halmstad has supplied *Oppmanna granite* for 14 columns for the Hopfner Hitzing Hotel in Vienna, and building fronts for a hotel at Jungfernstieg in Hamburg and for a business establishment at Zürich. At Stockholm the granite has been used for polished pilasters, extending through three stories in the house, Drottninggatan 57.

The province of *Blekinge* has long enjoyed a reputation as the headquarters of a very considerable stone industry, thanks to its grey and red granites, ranging from fine- to medium-grained, and its closely related gneisses, among which may be distinguished the following kinds: *grey* or *reddish gneiss* (*»kustgneiss»*), *small-grained granite*, closely resembling the Bohuslän granite, *porphyritic granite* (the so-called *»Karlshamn granite»*), *Archean granite* and *granite-gneiss*. A detailed report of the stone industry in Blekinge is embodied in the Geological description of the province of Blekinge (Sveriges Geologiska Undersöknings publikationer, Ser. Ca, N:o 1) and, referring the reader to this work, we shall content ourselves here with a few brief remarks. The stones, spoken of above, find a market chiefly in Germany and Denmark for pavements, quays and docks, etc. The greatest part of the stone which is worked in Blekinge (and, in fact, practically all the stone which is exported to the towns of Germany) is sold to North Germany within the confines of an area, bounded by a line passing through Tilsit, Thorn, Frankfurt on the Oder, Magdeburg, Hanover and Osnabrück. However, by no means inconsiderable quantities of stone have been exported to towns situated more in the south, as for instance, to the Rhine district, where cheaper steamship freights facilitate the disposal of the stone over a more extensive area.

Among more prominent works, executed partially or almost entirely of Blekinge stones, the following may be mentioned: the dockyard at Karlskrona; docks and quays at Neufahrwasser, Kiel and Wilhelms-hafen; the Warnow locks at Rostock; the harbour of the Korsör steam-ferry-boat; the basement of All Saints Church at Lund; the Monument at Fredriksborg Castle, near Copenhagen, in memory of the abolition of bondage.

*Aktiebolaget Karlshälls stenhuggerier*, now *Skandinaviska Granit-aktiebolaget*, have supplied the grey porphyritic granite, known as Karlshamn granite, for the basements and sculptured porches of the Telegraph Office at Copenhagen and the Gefion-Gylfe block of building in the same town.

*A. K. Fernström*, Karlshamn, have supplied granite from Blekinge (Kullö) for the following important works: the Königin Luise Bridge at

Tilsit; the great harbour-works at Lübeck and Copenhagen (Kallebodstrand); the Oberlandesgericht, Hamburg (basement); the bridge over the Trave Canal at Lübeck, the steam-ferry station at Gjedser, the harbour-works at Malmö, etc.

Among the numerous granites which occur in *Småland*, those which are found in the government of Kalmar (Kalmar län) along the coast between Mönsterås in the south and Gamleby (Garpedans) in the north have been quarried on an extensive scale in virtue of their beauty, their regular cleavage and their excellent lay. They are generally red, medium-grained, not unfrequently coarse-grained granites which, according to the proportions between the minerals of which they are composed, their varying colours, and the size of their grains, are differently named. The chief of them are the large-grained, red *Virbo granite*, the brilliantly crimson *Uthammar granite*, closely related to the former, and the *Vånevik granite*, likewise coarse-grained, red, and rich in blue quartz. In the last-named granite, however, the colour of the quartz varies in different localities from pale-blue to sky-blue and these variations of colour are characteristic of the stone generally. In plate 2 is reproduced a *Vånevik granite* with pale quartz. Among other granites which are met with on the east coast of *Småland* we may mention the beautiful, red granite from the Jungfrun Island in Kalmar Sound which goes by the name of »*Virgo*», and the medium-grained, usually red granites from *Flivik* and *Hålvik*.

A great many of the above-named *Småland granites* have been exported in the form of rough blocks to Germany, Scotland (Aberdeen) and England, where they have been fashioned into monumental stones which have found a market, not only in the countries enumerated above, but also in America, Canada and other parts. A fairly large number of them, however, particularly those with a smaller grain, medium-, small- or fine-grained, — as, for instance, the aplite granites in the Oskarshamn and Paskallavik districts, the granites at Garpedans and in the vicinity of Västervik —

are worked up into paving stones and scantlings at the places, where they are quarried.

The Vånevik granite can be obtained in whole blocks entirely free from cracks of a length of as much as from 9 to 13 metres and a breadth of from 1 to 2 metres, a circumstance which, in conjunction with its beautiful colour, stamps it as admirably adapted for monumental purposes.

The firm *Kessel & Röhl*, Berlin, which has now almost entirely abandoned its business operations in Sweden, has executed pedestals out of the above-mentioned Virbo and Vånevik granites for a large number of monuments in Germany and other countries.

The *Virbo granite* has thus been used, to give a few examples, for the Siegesmonument, the King Frederic IV Monument, the Emperor William Monument in front of the Palace, and the Bismarck Monument before the Parliament building, all in Berlin; the Soldiers' Monuments at Greifenhagen and Gützkow; the Emperor Frederic Monument, Homburg, and the King William I Monument, Stuttgart.

The *Vånevik granite* has served as the material for the pedestals of the Emperor William Monuments at Bromberg, Calbe a. S., Dessau, Flensburg, Friedrichshagen, Grätz, Lennep, Lübben, and Ratzeburg; for the »Denkmal des grossen Kurfürsten», Berlin; for the Soldiers' Monuments at Darmstadt, Ragnit, and Frankfurt a. O.; for the pedestal of John Ericsson's bust (at Nybrohamnen), Stockholm.

The above examples of the use of these granites might easily be multiplied, but with regard to them, as in fact for all other granites exported to foreign countries in rough blocks, it is a matter of great difficulty to obtain information, even regarding the more important and greater works which have been constructed out of Swedish granite.

*Carl J. Schylander's Granitaktiebolag* has exported rough blocks of *Uthammar granite* under the name of »*Bon Accord Red*» to Aberdeen, where they were sawn, cut, ground and polished, and then sent to various foreign markets, exclusively for monumental works. The following more important works have thus been constructed out of this granite: the pedestal of the Bismarck Monument, Dresden; the Aschrott Mausoleum, Weissensee (Berlin); the building fronts of Kempinsky, Leipzigerstrasse, Berlin; the Stollwerk warehouse, Berlin; Café Trömel, Plauen; Modehaus Rose, Dortmund; various monuments and other works in Austria, Belgium and France.

The same firm has furnished *granite from Hålvik* for the new Post-office, Malmö; for the Teddington docks in London, the new harbour of Malmö, and the harbour of Härnösand.

The firm *A. K. Fernström* has supplied facade stone of »*Virgo granite*» for the Stollwerk warehouse, Cologne, and for a warehouse at Wilhelmstrasse, Berlin, and further the socle of the Kurfürstendenkmal at Homburg v. d. Höhe.

In the interior of the country, at *Lugnås* in *Västergötland*, a decomposed and kaolinised gneiss, in its nature and application closely related to the sandstones, is exploited. It is used for the well-known *Lugnås* millstones.

At the *Grafversfors Stenhuggeri och Sliperi* in *Östergötland* a number of beautiful and decorative granites which have found a market chiefly in Sweden itself have been largely worked. On plates 1 and 2 three kinds of *Grafversfors granite* have been reproduced viz a very coarse-grained variety with red and yellow felspar (designation of the firm: *Grafversforsgranit* N:o 8), secondly a dark-brown, coarsely crystalline kind with blue quartz and dark felspar, sometimes labrador (*Grafversforsgranit* N:o 6), and finally a high-red, medium-grained sort, likewise containing blue quartz (*Grafversforsgranit* N:o 1). All these stones are admirably adapted for decorative purposes, and, at one time, they were largely employed, but at present it is only the last-named variety, that is being quarried.

Thus, for instance, N:o 1 was used for the new fountains at the *Roya Palace*, the roof cornices, etc. of the *Parliament House* and the building of »*Sveriges Riksbank*», *Stockholm*; N:o 8 for two polished columns in the *German Church*, *Stockholm*; N:o 6 for 20 polished columns of the so-called »*Palmeska huset*» at *Kungsträdgården*, *Stockholm*.

Of the remaining granites of *Östergötland* there is only one, a fine-grained, grey and red granite at *Östkind* in the archipelago which is quarried. It is used exclusively for paving and border stones.

Among the granites of *Uppland* we may first call attention to the grey, small- to fine-grained *Stockholm granite* which is quarried partly by the town itself, partly by private firms in order to cover the requirements of the capital for paving, quay, and building stone. Furthermore, it is largely used for basements and wall linings, as well as for monuments; it is not exported. The more important quarries are situated, some in *Svartsjölandet*, west of the town (*Svartsjö*, *Hilleviken* and *Stenhamra*), others at

Sundbyberg, Hufvudsta, and other places to the north-west and at Almnäs railway station in the parish of Tveta, 12 km. from Södertälje.

Among more important works for buildings constructed of Stockholm granite, we must mention above all »Lejonbacken», the ascent to the Royal Palace, with the great monolithic columns right in front of the south end of Norrbro, the porch of the Royal Library, the pedestals of Linnæus' and Axel Oxenstierna's and other statues, the candelabra of »Djurgårdsbron», the basements of the Parliament House, »Dramatiska teatern» and »Nordiska Museum», as well as the terraces and obelisks in front of the latter, all at Stockholm.

A granite which in recent times has begun more and more to supersede the Stockholm granite in more important works for buildings, such as basement stones, etc., is the *Norrtälje granite*, usually red in colour which is found at Vätö and other places north-east of Norrtälje. According to its variation in grain or colour it may be subdivided into different varieties.

This granite has been utilised on a very extensive scale for the Parliament House and the building of »Sveriges Riksbank» (pl. 10). Thus all the extensive fronts with the columns are of coarse red Norrtälje granite proper, while a finer variety of it has been used for the tower top-stones. The *Norrtälje Mekaniska Stenhuggeriaktiebolag* has furnished these parts of the building. Another important piece of work, executed by the same firm is the socle and the basement wall linings of the Royal Opera, Stockholm for which the coarse red Norrtälje granite has also been employed. Further examples of the utilisation of this rock are the fortification works in the district round Stockholm and the polished lower part of the pedestal of Gustavus II Adolphus' equestrian statue, Stockholm, the latter furnished by *Aktiebolaget Hilleviken*.

Among other granites, quarried in Uppland, we need only mention the grey, medium-grained, hornblendic *Uppsala granite* which has been used to meet the demand of the city of Uppsala for paving and building stone.

In various parts of *Northern Sweden* regularly jointed granites are met with; most of these, however, have not yet found a market. This is, for instance, the case with the high-red granites along the coast-line between Härnösand

and Örnköldsvik, in Ulfö and other neighbouring islands, and on the mainland off which they lie. *Aktiebolaget Syenit* has, however, now acquired the exclusive right to quarry not only these red granites, but also the »black granites» (diabases and gabbros) which occur there, and thus it will probably not be long before these rocks are exploited for stone industrial purposes.

There are, however, two of the granites from the north of Sweden which are worth mentioning. The one is a red, fine-grained gneiss-granite, occurring on the North Trunk Line between the stations of Kilafors and Holmsveden, and bearing the name of *Kilafors granite*.

It was largely used in the Parliament House and the building of »Sveriges Riksbank» for sculptural and decorative purposes and was found to be an admirable rough material. Thus most of the sculptures and ornaments in these buildings have been constructed out of this stone, as, for instance, the Svea group, the Swedish coat of arms, the pedestal of the candelabra on the grand staircase, the spires of the roof, the lions, facing the Vasa bridge, the shields, arms and crowns of the »Riksbank», etc.

The other is the *Örnköldsvik granite* from Åsberget near Örnköldsvik; it is grey, medium- to fine-grained, generally somewhat porphyritic, and contains muscovite. In later times it has begun to be quarried for building and monumental purposes, and has been found to be easier to quarry than the Stockholm granite to which it bears some resemblance. On plate 4 we find a coloured reproduction of this stone.

To illustrate the uses to which it has been applied, we may mention the polished upper pieces of the pedestal of Gustavus II Adolphus' statue, Stockholm, and the basement of the »Sundsvalls Handelsbank», both supplied by *Aktiebolaget Hilleriken*.

**Porphyries.** In central and southern Sweden porphyries are very extensively distributed, but, by reason of the lack of beauty in their colours and their liability to contain joints and cracks, they have not been quarried in those parts, with the exception of a brown *gangue-porphyry* occurring at Emmån, N. N. W. of the country-town of *Mönsterås* in Småland

which has been utilised for buildings in the district, and proved to be a suitable and straight fissile building material.

Quite different is the case with the porphyries of northern Sweden, and of *Dalecarlia* in particular, where a whole series of porphyries of singularly beautiful and variegated colours are found, concentrated within a comparatively confined area. When we add that the *Dala porphyries* or, as they are sometimes termed, the *Elfdal porphyries* are suitable for quarrying, compact, hard rocks which permit of the working of the sharpest edges and on polishing take on a first-rate glassy gloss, it will be understood, that they form an admirable and highly valued material for the fashioning of decorative objects. Such is the beauty of these porphyries in a polished state, that many of them, in appearance at any rate, can vie with and some even surpass the kinds, most high in favour in ancient Rome.

The most important varieties of Dala porphyry are the following: the dark-brown, compact *Blyberg porphyry* (successfully reproduced on plate 8), dotted with yellow porphyritic felspar, from Blyberg, in the parish of Elfdalen; the black-brown *Rännås porphyry* with red, porphyritic felspar crystals; the one-coloured red *Bredvad porphyry*; the dark purple *Klittberg porphyry*, the porphyritic felspar of which has a yellowish-white colour, and finally the *red granite-porphyry* (reproduced on plate 3), with micropegmatitic ground-mass and yellow to red porphyritic felspar. It may serve to give some notion of the great wealth of colours of which the Dala porphyries can boast, if we mention that table-slabs in mosaic have been constructed from these rocks with pieces in no less than 64 different and distinct shades of colour. It should be added, however, that not all the stones of which these slabs were composed are porphyries, but other rocks occurring in the district, either in mountains or in the form of erratic boulders have been utilized as well. Among these may be mentioned the *green phonolite* (cancrinite-ägirine-syenite) from Särna and the *Åsby*

*diabase*, medium- to coarse-grained, and of a beautiful ophitic structure. In »Carl Johan's galleri» in Drottningholm Castle near Stockholm there is a superb ornamental table in which all the different kinds of Dala porphyry are represented.

All of these were worked at the ancient Elfdalen porphyry-works which, as has already been mentioned in the brief historic review which opens this treatise, was one of the oldest stone-works in Sweden.

Among more important decorative objects, fashioned at these works, the following may be mentioned: King Carl Johan's sarcophagus in Riddarholm Church, and a large vase in front of the Palace of Rosendal in Djurgården Park, Stockholm; the latter holds 3,000 liters, has at its upper edge a diameter of 3,59 metres and a height of 2,67 metres. Both these magnificent pieces of decorative art are made of the above-named red granitic porphyry. In the »National Museum», the museum of »Sveriges Geologiska Undersökning» and the Royal Palace at Stockholm numerous urns and vases made from different varieties of Dalecarlian porphyries are exhibited. The pedestals of Gustavus III's statue and a number of sepulchral monuments at Stockholm are made of Blyberg porphyry which is one of the most beautiful of Dalecarlian porphyries, and from which a large number of smaller decorative objects, articles of household furniture, and other things — such as urns, knife-handles, salt-cellars, butter-dishes, etc. — have been manufactured. For this latter purpose the porphyry is eminently suited, and the only works in Dalecarlia, with porphyry as its rough material, which are being carried on at the present date, namely the *Elfdalen New Porphyry-works*, are engaged chiefly in the manufacture of such minor household requirements.

An attempt, made in the year 1900 to resuscitate the old Elfdalen Porphyry-works and conduct them on a greater scale, proved an economical failure.

**Diorites, gabbros, diabases, hyperites and other basic rocks.** The term »*black granite*» is applied collectively to certain dark eruptive rocks, the geological and petrographical names of which are given in the head of this section, and which have been extensively used mainly for the construction of tombs, monuments, and other works of ornamental art, both in Sweden and abroad. As the term »*black granite*» embraces a number of rocks, differing not only in mineralogical composition and nature, but also in structure and grain,

there are quite a number of »black granite» varieties, ranging from more or less pure black to black with light or dark shades of brown, green, blue and grey. The black granite which is in greatest request and in Germany commands a price of close on 300 marks per cubic metre, is that which possesses an uniform deep black colour and an uniform (as a rule, fine- or small-grained, ophitic) structure.

The Swedish black granite was placed upon the market in the eighties by the *Hörtingerum grindery*, the rough material, consisting of *diorites* and *gabbros* from the Väster-vik district in Småland, worked both in quarries, as at *Gagersvik* in *Högö*, and other places, and is also obtained from erratic blocks.

First quality black granite is now being quarried in many places, particularly along a belt of country extending from the north-west of Scania past the south-western part of Vättern up to the north-eastern shore of Vänern, following, in the main, the eastern boundary of the »iron-gneiss formation of Sweden». The rock is, as a rule, a *bronzite-diabase*, associated with the *hyperite*, and containing dark feldspar, filled and coloured with a brown pigment. The same dark feldspar is also met with in the *hyperites* which have likewise been utilised as black granite in places where they are found to be otherwise suitable. The most important »black granite» quarries lie in the north-west of Scania (*Hajstad*, *Myren*, *Gedenryd* and other places in the districts round lake Immeln, in Kristianstads län) and in Småland (*Möckelsnäs*, *Målaskog*, *Hjortsjö*, *Rydaholm*, etc.). The sample, reproduced on plate 6, comes from the last-named place. Finally, these rocks are quarried in Värmland near *Ölme* station north-west of Kristinehamn, and other places.

In Blekinge, at *Karlshamn* and in the surrounding district, as well as at *Holje*, *Brännarebygd* and other places, a greyish-black, fine- to medium-grained *olivine diabase*, the appearance of which when polished is reproduced on plate 6, has been quarried as a »black granite» for export in rough

blocks. At the works of the *Uddevalla Mekaniska Stenhuggeri och Sliperi, Hebbel & Co.* two groups of bears by the sculptor MILLES, intended for Berzelius' Park, Stockholm, are being sculptured out of a »black granite» of this kind from *Sternö* off *Karlshamn*. Stonecutters, however, no longer use the name »black granite» for these lighter varieties. Thus the rock of which we have just been speaking is also termed »blue-grey syenite».

In several places in the north of Sweden we encounter rocks, closely allied to the latter, though, as a rule, with a coarser grain. Among these we must reckon the olivine-containing »*Åsby diabase*» from *Dalecarlia* (see p. 22—23), and the diabase from *Galtström's bruk* in *Medelpad* (not marked on the map), reproduced on plate 7, is a coarse-grained, typical »*Åsby diabase*». Finally, *gabbros* and *diabases* occur in the *Ångermanland* archipelago, in *Ulfö* and other places (compare p. 21).

**Micaceous schists and clay slates.** For the manufacture of roofing slates several different rocks of a pronounced parallel-planed schistosity have been quarried in Sweden. The chief among those which are still being quarried are: grey *micaceous schists* from *Glafova* in *Värmland*, from *Nordön* near *Tjufkil*, and from the parishes of *Lycke*, *Solberga* and *Jörlanda* in *Bohuslän*; and black-grey to light-grey *clay slates* from *Grythytted* in *Västmanland*, as well as from *Hällan*, *Halöngen* and other places in *Dalsland*. The clay slates are far superior to the micaceous schists in lightness and durability and also surpass them in decorative effect. The micaceous schists occur, as a rule, in thicker layers and are, therefore, better adapted for landings, floors and pavement stones.

Some years ago roof-slates were also made of *hällflint-schist* from *Fredriksberg* in the interior of *Småland* and a grey *quartzitic schist* from *Mo* in *Jämtland*.

The dark, grey *Grythytte schist* has been used in »*Nordiska Museum*», the new Post-office, *Oscar's Church*, and *Matheus' Chapel*, Stockholm; in the

Castle, Savings-bank and Technical College at Örebro, the Public school at Lund, the Museum at Malmö, in various pilotage and lighthouse buildings, and in other works.

**Pot- or Soap-stone** has been quarried at *Löddby* in Uppland, *Töcksmark* in Värmland and in various places in *Dalsland*, but quarrying at these places has now been almost entirely abandoned. On the other hand, the pot-stone industry at *Handöl* in Jämtland is still being developed, and the pot-stone there is now being worked on a very large scale.

In virtue of its softness and durability pot-stone is an excellent material for the finer kinds of ornamental and sculptural work for buildings and external architecture. Further, owing to its refractoriness and high specific heat it is admirably adapted for the manufacture of stoves and for the inner lining of brick-stoves and smelting-furnaces, etc. The Handöl works manufacture not only ornamental and sculptural pieces, but also stoves and hobs, as well as a number of household articles, such as preserving pans, mortars, frying-pans, etc. The waste from the working of the pot-stone is pulverised and used for the manufacture of so called fire-proof paint.

The most remarkable works of pot-stone in Sweden are the interesting sculptures on the south porch of Uppsala Cathedral, made from the dark Löddby pot-stone.

**Sandstone** is one of the most important natural building stones in virtue, not only of the comparative ease with which it can be quarried and worked, but also of its power of resistance to atmospheric influence. In Sweden sandstone is found at several different geological levels, and it has been worked almost everywhere where it has been found practicable to quarry it, even in places where it is only met with in erratic blocks.

To the sandstones of the *Pre-Cambrian formation*, or what is known as the *Algonkian sandstone*, belong the com-

paratively hard sandstones occurring near Gäfle, and between that town and Storvik along the line of the North Trunk Railway; they are medium-grained, and are found in different colours, being sometimes uniformly grey, yellowish or red, sometimes striped, alternately red and grey, and occasionally greenish. The westernmost quarry (grey sandstone) is situated at Lem nearly due east of Storvik. Not only *Gäfle sandstones* from the Gäfle district itself are utilised, but also the numerous erratic blocks which are found scattered in the regions to the south and south-east of this district, especially at Roslagen, whence it has also received the name *Roslag sandstone*.

At *Stockholm* it has been used in both older and more modern buildings, as for instance, the Royal Castle (sub-basement, steps, etc.), the English Church, the Academy of Fine Arts (basement), the front of the beautifully decorated von Halwyl Palace (Hamngatan N:o 4), the house Birger Jarlsgatan N:o 2, the »Nordiska Museum» of so-called rubble-stone masonry of motley hues, and whose doorcases in pink Gäfle sandstone, furnished by *Bröderna Gustafsson*, Stockholm, is particularly noteworthy; the same firm has also furnished sandstone work for the restoration of Drottningholm Castle. Gäfle sandstone has also been used for Tyresö Castle in Södermanland, Ljunglöf's villa in the parish of Bromma, Stockholms län, as well as for the building of houses in several towns near the district in which the rock is found: *Gäfle* (the Central station, the Gäfle-Dala Palace, the Murén Baths, Kronberg's villa, and other buildings), *Falun* (the Central Palace, the Provincial Record-office, and Kristina Church), *Uppsala* and *Sala* (the military barracks).

Not only building stone but also millstones, pavement stones, step-stones, tombs, etc. are made of this sandstone. The quarryings are sold to iron-works.

Other sandstones belonging to the Algonkian period, spoken of above, are (1) those which occur in the islands of *Pingst* and *Midsommar* in the lake Mälaren and which have been quarried to supply the needs of the capital for house-building stone (garlands over the door and medallions on the fronts of the Parliament House and the »Riksbank», (2) *Dala sandstone* which occupies a large area, extending along the Västerdal river and between it and the Österdal river. The Dala sandstone resembles the Gäfle sandstone in grain, colour, and quality in general. However,

partly owing to its somewhat out-of-the-way situation and the consequent expensive freight, it has hitherto only been used for local requirements, particularly for the fabrication of millstones, whence its area of extension has not been marked on the map.

The so-called *Visingsö series*, whose rocks (sandstones and schists) occur at the lake Vättern and on islands and sheers in that lake, is of yet undetermined geological age. At *Vik*, south-east of Jönköping millstones have long been fabricated from a fine-grained yellow sandstone belonging to this series. Sandstone of the same series has also been quarried at *Trånghalla* (north of Jönköping), in *Visingsö*, and in the district round *Grenna*, as well as at *Lemunda*, *Lilla Hals*, and several places north-west of Motala.

The *Grenna sandstone* is yellow and more or less hard, and is said to become harder and better able to resist after having been exposed to atmospheric influence than just after it has been quarried, a circumstance which may be explained by mineralogical changes which favour these conditions. It is used not only for building fronts but also for steps, pavements, etc.

At Stockholm there are some houses which have partially been faced with Grenna sandstone, and the new building of »Bankaktiebolaget Södra Sverige» at Malmö and the house of the builder Retzner at Hälsingborg have their whole building fronts of this material.

The *Lemunda sandstone*, partly deep white, partly yellowish, forms beds but slightly jointed and has, from times of old, been used for millstones and whetstones, as well as for building stones. Now-a-days it is also manufactured into defibrating stones for the wood pulp industry, refining stones, etc.

This sandstone has been used in the terrace of Johannes' Church, Stockholm, and in other buildings.

The *Lower Cambrian sandstones* at *Simbrishamn* in Scania and at *Runnö* in Kalmar Sound (also in erratic blocks

from Runnö along the west coast of the sound) are used for the fabrication of millstones. The rock ranges in colour from white to somewhat yellowish, and is fairly hard. Of the same age are the sandstones which occur at the foot of the Cambrian-Silurian deposits of *Västgötabergen* and which have been exploited at *Kinne-kulle*, the district about *Stens-torp*, north of *Sköfde*, the northernmost point of *Billingen* and other places. They are, as a rule, grey or greyish-yellow, fine-grained, rich in quartz, usually quite hard. Owing to their richness in iron pyrites they assume in decomposing a yellow and brown flame colour. We may class under the same head also the sandstone found in Närke which is quarried at *Sjötorp*, east of Örebro, and has been pretty extensively used for fronts of buildings, both in Stockholm, e. g. the building of the daily paper »Svenska Dagbladet», and in the provinces, particularly the town of Örebro.

The *Upper Silurian sandstones* at *Övedskloster* in Scania, at *Burgsvik* in the south of Gothland and at *Kallmora* in the parish of Orsa in Dalecarlia are the most important of all for the stone industry.

The *Öved sandstone* which is quarried in mines is fine-grained and has a warm reddish-yellow tinge; it is reproduced on plate 8. It is now being exploited in a rational manner, and as the stone has excellent qualities for building purposes and is adapted for the carving of ornaments of the most delicate finish, it has found a considerable market.

The Skåne bank (plate 11), the Post-office, the new building of »Syd-svenska Kreditaktiebolaget», and other buildings at Stockholm have been constructed of this stone. Moreover it has been used for the building fronts of the Scania Building Company at Stortorget, Malmö; the building of »Bankaktiebolaget Södra Sverige», Hälsingborg; the building of »Norrköpings Enskilda Bank», Norrköping; the Electric works' building and Consul Wi-cander's house in Djurgården, both at Stockholm; the Grand Hotel, Lund; Malmgren's house at Stora Nygatan and Schmitz' villa, Malmö, etc., etc.

The *Burgsvik* or *Gothland sandstone* seems, however, to be that which is best adapted for the finer kinds of sculptured

work, as is strikingly attested by the well-preserved ornaments in a number of Gothland churches. It is light-grey in colour. In spite of its excellent qualities, however, the quarrying has hitherto not been conducted on extensive lines. The stone is shipped out in rough blocks to stone-cutting firms, chiefly at Stockholm.

As an instance of its adaptability for the finer ornamentation we may mention the sculpture of the house N:o 68 Västerlånggatan, Stockholm. It has also been used for the building of »Sveriges Riksbank», branch-office at Uppsala; the new Police Station in Stockholm; the houses 9 Västra Trädgårdsgatan, the block »Sparfven» at Stureplan, »Städernas Allmänna Brandstodsbolag» (20 Skeppsbron), »Mälarbadet» at the Norr Mälarstrand, all in Stockholm (furnished by the firm *Ericsson & Kjellström*, Värtan, Stockholm); furthermore for window cases and cornices in the Royal Palace, for the coat-of-arms over the porch of the Härnösand Bank, Stockholm; for cornices and exterior ornamentation, as well as interior details in the new Church of Västervik, for thicker ornamentation in St. Johannes' Church, Malmö.

*Orsa sandstone* which is quarried near Mässbacken railway station is generally pink or yellowish-red, occasionally more greyish.

Instances of its use for front stones, cornices, porches, balustrades, etc. are: the County Hall at Orsa in Dalecarlia, the new building of the Mälar Bank in Skeppsbron and the building of »Skandinaviska Kreditaktiebolaget» (8 Arsenalsgatan), Stockholm; moreover, it has been used along with Scotch sandstone in the Graham Mansions at Kungsholms torg, Stockholm.

Sandstones belonging to the *Jura formation* occur at *Pålsjö* near Hälsingborg and at *Brandstorp* and *Täppeshusen* south-east of Höganäs. At Pålsjö it has been quarried for grindstones, whetstones, etc. It is fine-grained and grey, not unlike the Gothland sandstone, and was formerly used also for building stones.

To the same formation belongs the sandstone of *Hör* which is of quite a different quality. It varies in colour, is a very hard, small- to fine-grained quartz sandstone, rich in felspar and is made into millstones. On it lies a fine-grained true sandstone, composed chiefly of small quartz grains, and is used for building stones. It has been used in the Cathedral at Lund and other buildings.

**Limestone**, next to sandstone, is the stone which has been most utilised for building purposes. It is true, that it is inferior to granite and sandstone as a stone for outer linings, as it is more easily affected by atmospheric agencies and weathering, nevertheless Sweden possesses several limestones which are well adapted for this purpose. For inner linings, for floors, steps, etc., as well as for pillars, cut and sculptured works it is particularly suitable.

In respect of quality it is usual to distinguish two different kinds of limestones, viz the *true marbles*, or the crystalline limestones, often more or less dolomitic, and the *compact limestones*.

*Marble*. Sweden is fairly rich in marbles of varying colours, but only very few of them are used in the stone industry. They all occur in the form of layers and lenticular bands within the archean rocks of Sweden, and are hence also called Archean limestones («urkalkstenar»). Several of them, however, are unsuitable for architectural purposes on account of their want of homogeneity, their joints, and abundance of cracks, but many of them have been applied to technical purposes in blast-furnaces and for the burning of lime.

Among the more important marbles of Sweden we must mention first and foremost the green *Kolmård marble* whose colour, due to the presence of serpentine, makes it extremely original and well-nigh unique among marbles. As we have mentioned above, the Kolmård marble has been quarried for about 250 years. The deposits lie on a steep escarpment at *Bråviken*, 25 km. from Norrköping, and are worked on the most up-to-date and rational lines. The marble is, no doubt, well-known to the public from the numerous decorative objects, table slabs, tombs and other products which were executed here in former days and distributed over the whole of Sweden. Now-a-days it is not so much used for external architecture, as its appearance has been found to be subject to considerable alteration in the course of time. On the

other hand it is a first-rate material for inner wall linings, floor-slabs, columns, etc., and in a polished state, especially in combination with bronze, of superb decorative effect. Like the Mölnbo marble, mentioned below, it is also used for the manufacture of polished mortars. Its appearance is depicted on plate 7.

The marble quarries at Bråviken which are now being exploited by *Nya Marmorbruksaktiebolaget*, Norrköping, have furnished marble for building both in Sweden and abroad. Among them the following are deserving of mention: Royal Palaces at Stockholm, Drottningholm and Rosendal, the National Museum, the »Nordiska Museum», and the Royal Opera-house; Uppsala University; the University, the Exchange, and the building of »Skånska Handelsbanken», branch-office at Gothenburg; »Norrköpings Enskilda Bank» and the Standard Hotel at Norrköping; »Skånes Enskilda Bank» at Malmö and branch-office at Landskrona; »Östergötlands Enskilda Bank» at Linköping; »Skånska Handelsbanken», branch-office at Hälsingborg; the Coliseum Theatre, Shoreditch Townhall, the London and County Banking Co., St. Saviour's Church (Poplar), Hotel Continental (Regent Street), Lyons' Popular Café (Picadilly), Lyons Tea Shops, Blackfriars Bar and the Scottish Temperance Life Office, all in London; the Consumption Hospital, Manchester; the offices of the Electric Tramway Company and Elster Dempster & Co's offices at Liverpool; the North British Mercantile Insurance Co., Glasgow; the Royal Insurance Company, Lincoln; the Grand Opera, Paris; Café du Commerce, Marseilles; the Imperial Steam Yacht »Hohenzollern», the Bristol Hotel and Victoria Café, Berlin; the Klosterburg, Hamburg.

The designation »Kolmård marble» which was originally only used for the green marble from the quarries at Bråviken has of recent years come to serve as a collective name for all the Swedish green marbles. Green marble resembling the true Kolmård marble more or less closely in composition and colour is now being quarried in various places, as at *Groppetorp* and *Claestorp* near Katrineholm, and at *Mölnbo* and *Vrå* and other places in Södermanland.

Among the more important works of marble, furnished from these places, the following may be mentioned. From *Groppetorp* (supplied by *Grafversfors Stenhuggeri och Sliperi*) inner wall linings for the »Dramatiska» theatre, the Oscar's theatre and the »Nordiska Museum», the entrance steps and the vestibule of the Parliament House, the marble floors in the buildings of »Sveriges Riksbank», the »Diskontobank» and »Bankaktiebolaget Stockholm—Öfre Norrland», the green marble fire-place in »Operakällaren», all in Stockholm; the building of »Sydsvenska Kreditaktiebolaget» at Malmö.

From *Mölnbo* (supplied by *Bröderna Gustafsson*): the doorcase between the hall and the vestibule in the »Nordiska Museum», the vestibules of the Parliament House and of the building of »Städernas Allmänna Brandstodsbolag» at Skeppsbron, altar railing in »Stor-Kyrkan», Stockholm, the counters of »Inteckningsbanken», Stockholm, and »Skånes Enskilda Bank», branch-office at Hälsingborg, etc., etc.

From *Vrå* the flooring of Klara Church, Stockholm, has been furnished.

In modern times several marble deposits have been quarried, though just at the present the quarries are not being worked. Such are the light marble of a green and red flame-colour from *Singö* in Roslagen, the red and yellow, flame-coloured marble from *Vattholma* in Uppland, the red and white marble from *Gistad* in Östergötland, and, finally, a lovely, red, yellow and white marble from the vicinity of the town of *Nora* at the lakes of Viken and Älflången. Besides which several other marbles (e. g. that at *Torsåker* in Gästrikland, the reddish marble from the *Dylta* district in Närke, and the pink marble from *Vinskärr* in Uppland) have been quarried at periods.

The *Vattholma* marble, used in Uppsala Cathedral which was under building from the 13th to the 15th centuries, has furnished material for entrances and cornices at its restoration. Marble from *Vattholma* has also been furnished for the outer vestibule of the building of »Skandinaviska Kreditaktiebolaget» at Stockholm. *Nora* marble has been used for the door-case of Hôtel Rydberg, and *Dylta* marble for Oscar's Church, Stockholm.

During recent years a beautiful white dolomite marble from *Ekeberg*, north of Hjälmaren, in Närke, has been extensively exploited. Several of the more modern buildings in Stockholm furnish a striking testimony to the beauty of this marble and its adaptability for exterior architecture and sculpture.

The *Ekeberg* marble (most of the works have been furnished by *Ericson's & Kjellström's Mekaniska Stenhuggeri* and by *Grafversfors Stenhuggeri och Sliperi*) has been used in the »Dramatiska» theatre (see plate 12), the facades of the house called »Rosenska huset» (Strandvägen 55), »Sundsvallsbanken» (at Fredsgatan), the house called »Sagerska huset» (at Hamngatan), a house at Birgerjarlsgatan, the greater part of the white stone in Oscar's Church, all at Stockholm; also for monuments, e. g. the sepulchral monument of »Stockholms Nation» at Uppsala.

Several of the Swedish marbles which are well adapted for architectural purposes have, however, not yet been exploited to any large extent. For instance, the deposits at *Lånesta* and *Ada* in the Trosa district and at *Västra Malsjö* in Värmland. The last-named marble is white and bluish-white (slightly transparent in thin plates), and, as it appears, may be obtained in blocks of large dimensions.

The so-called *compact limestones* of Sweden which are quarried for architectural purposes belong all to the Silurian formation. Upper Silurian limestone is found in the island of *Gothland* and in *Scania*; Lower Silurian in *Scania*, in *Öland*, in *Närke*, *Västergötland* and *Östergötland*, *Dalecarlia*, *Jämtland* and in the northern provinces.

The Lower Silurian limestones belong to the lower division of the so-called *Orthoceras* limestone and are bedded in plane layers or beds of about 1 to 2 decimetres in thickness. The colour is either grey or reddish-brown. They are interbedded by clayey layers which, in certain cases, may have a detrimental effect owing to weathering, but, on the other hand, contribute to rendering the stone easy to quarry. In *Scania* *Orthoceras* limestone is quarried west of *Simrishamn*; in *Öland*, mainly on the west side of the island, at *Grönhögen*, *Ventlinge*, *Djupvik* and *Sandvik*; in *Närke* at *Yxhult*, *Hällebråten*, *Lanna*, *Vilhelmsberg* and *Tångsäter*; in *Västergötland* on Kinnekulle at *Hellekis*, *Råbäck* and *Gössäter* and about *Sköfde* and *Falköping* and other places; in *Östergötland* at *Berg*, *Västana*, *Borghamn* and *Tornby*; in *Dalecarlia* in the district of *Mora*; in *Jämtland* at *Brunflo* and other places.

For external architecture the Lower Silurian limestone has proved to vary in quality and suitability, according to the different layers and deposits. The stone is also largely used for steps, channelstones, footpathstones, paving, wall linings, etc., and is worked by machine, as well as by hand.

Among the more noticeable buildings for which *Orthoceras* limestone has been furnished, the following may be mentioned: limestone from *Öland*:

for »Nordiska Kreditbanken» at Drottninggatan, Stockholm, and the English Church at Copenhagen (parts of it); grey limestone from *Otto Undén, Gössäter*: for the newly restored Church of Mariestad; limestone from *Hellekis*: for the fronts of the houses N:os 15 and 16 Birgerjarlsgatan (grey *Orthoceras* limestone) and N:os 11 and 53 Strandvägen (chiefly reddish brown *Orthoceras* limestone), Stockholm; for the Savings bank at Mariestad, and the Royal Theatre, Copenhagen. Particularly noteworthy is the building material of brown *Orthoceras* limestone, furnished from Hellekis, for the whole front of the house N:o 76 Drottninggatan (corner of Kungsgatan) the upper storeys of which are built in so-called rubble, a style in which this stone shows to particular advantage (Plate 13). The *Borghamn* limestone: for the National Museum, »Södra Barnbördshuset» (Lying-in Hospital at the south of the town), the new Navigation School, and the childrens' hospital »Samariten», all in Stockholm, and for the fortress of Karlsborg. The *Närke* limestone from *Yxhult* and other places: for Uppsala University, »Bünsowska huset» at Strandvägen, the houses of »Härnösandsbanken» and »Bergslagsbanan», Stockholm, and St. Johanne's Church, Malmö. The *Närke* limestone has also been used in the »Nordiska Museum» (both for outer and inner parts). From *Aktiebolaget Lanna Stenhuggerier* stone has been furnished for the buildings of »Sveriges Riksbank», branch-offices at Falun, Nyköping, Vänersborg, Linköping, and Karlskrona, the Vanadis Chapel, the Chapel of the Oscar congregation, Stockholm, and the Technical school at Örebro.

Of the Upper Silurian limestones from Gothland several kinds have, from time to time, been quarried. Thus the red limestone which is found at *Hoburgen* and is known in the trade by the name of *Gothland marble* or *Hoburg marble* has, at different periods, been very extensively quarried. This stone is to be met with in several of Gothland's church porches, built in the Middle Ages, the surfaces and edges of which have been preserved almost intact, proving the adaptability of the stone for external architecture. Periodical quarrying has also taken place of a red limestone at Hall, north of *Färösund*, a light-yellow one in *Stora Karlsö*, a white one at *Klintehamn* and a grey one in the district of *Kappelshamn*. At present, quarrying of building stone is going on only in the stone quarries just north of *Visby*, where a greyish-white, partly somewhat oolitic, partly finely crystalline limestone is quarried on a very large scale.

The Gothland limestones which, in recent times, have been largely applied to technical purposes, are of very varied

nature and quality in respect to their use for architectural purposes. Some of them are very well suited, others ill adapted for this purpose, and the quarrying is usually attended by considerable difficulties. A geological investigation enables one to forecast, where the serviceable stratified limestones are likely to be met with, and where we may expect to find the reef-limestone, unsuitable for building stones.

The grey Gothland limestone has been used for the following buildings at *Stockholm*: the building of »Svenska Lifförsäkringsaktiebolaget» at Norrmalmstorg (pl. 14), Gustaf Vasa Church, the Royal Opera, the front of the house of »Bankaktiebolaget Stockholm—Öfre Norrland», the new building of »Lifförsäkringsbolaget Nordstjernan» at Brunkebergs torg, the County Hall at Haga, the house of »Aktiebolaget St. Birgitta», the new annex of the Grand Hôtel, Grand Hôtel Royal, the houses N:os 30 and 32 Narvavägen (also Gothland sandstone); at *Malmö* for the slaughter-house; at *Uppsala* for the house of »Mälarprovinsernas Enskilda Bank»; at *Hälsingborg* for the new building of the Skåne Bank; and in *Warschau* for the Telephone office. Most of these works were furnished by *Carl Müller*, Visby. The Academy of Fine Arts and the entrance hall of von Halwyl Palace at Hamngatan, Stockholm, are examples of the use of the red, so-called Gothland marble.

### On the crushing strength of some Swedish stones.

The Swedish stones have on being tested proved to possess excellent qualities both with respect to resistance to wear and tear and weathering, and durability in general. This is particularly true of the granites and gneisses of Sweden which belong to the Archean rock, and these granites have accordingly been much in demand, and have held their own against competition. If, for instance, we compare the accessible certificates, issued by the laboratories, with regard to crushing strength, it will be found that the Swedish granites and gneisses, as a rule, keep above the average values in this respect. The first table on the opposite side, accordingly, gives the average values of the determinations which have been made in the course of ten years at the Charlottenburg laboratory

with respect to the compressive strength of the granites, limestones and sandstones. The table which follows it gives the corresponding figures for some Swedish stones.

**Table giving the average crushing strength of the chief building stones.**

Stones.	Number of investigations.	Average crushing strength in $\frac{\text{kilos}}{\text{sq. cm.}}$			
		In a dry state.	In a soaked state.	After having once been frozen and tested	
				In the air.	Under water.
Granites . . . . .	5,530	2,206	2,078	2,037	2,037
Limestones . . . . .	800	1,028	972	955	932
Sandstones . . . . .	3,960	922	850	822	825

**The average crushing strength of a number of Swedish stones.**

Granites and Gneisses. <sup>1)</sup>	Average crushing strength in $\frac{\text{kilos}}{\text{sq. cm.}}$			
	In a dry state.	In a soaked state.	After having been frozen and tested.	
			In the air.	Under water.
<i>The Bohuslän granite</i> from J. and A. Nielsen's quarry at Bräcke near Lysekil . . .	2,708	2,495	—	2,612
<i>The grey Bohuslän granite</i> from quarries, belonging to A.-B. Gunnerson's Stenhuggerier, Lysekil . . . . .	2,753	2,926	—	2,498
<i>Red ditto.</i> from do., do. . . . .	3,032	2,626	—	2,762
<i>Grey Bohuslän granite</i> from A.-B. De Förenade Stenhuggeriernas stenbrott, Strömstad . . . . .	2,605	2,392	2,381	2,333
<i>Black-green Varberg granite</i> from Granitaktiebolaget C. A. Kullgren's Ånka, Uddevalla . . . . .	2,416	1,988	2,017	2,057

<sup>1)</sup> The determinations are made at the Königliche Mechanisch-technische Versuchsanstalt, Charlottenburg, Berlin.

Granites and Gneisses.	Average crushing strength in <sup>kilos</sup> sq. cm.			
	In a dry state.	In a soaked state.	After having been frozen and tested.	
			In the air.	Under water.
<i>Red-grey Bohuslän granite</i> from »Skandinaviska Granit A.-B.'s in Halmstad» quarries at Hunnebostrand . . . . .	2,144	2,056	—	1,835
<i>Red-grey Halland gneiss</i> from Söndrum quarry, belonging to Skandinaviska Granit A.-B. in Halmstad . . . . .	2,219	2,098	—	1,984
<i>Ditto.</i> from the quarries of the same firm at Stensjö in Halland . . . . .	2,190	2,017	—	2,042
<i>Grey granite</i> from the quarries of the same firm at Gunön in Blekinge . . . . .	2,681	2,484	2,350	2,658
<i>Granite</i> from the quarries of the same firm at Matvik I in Blekinge . . . . .	2,877	2,692	—	2,861
<i>Grey-brown granite</i> from the quarries of the same firm at Matvik II in Blekinge . . . . .	2,211	2,424	2,108	2,443
<i>Grey, fine-grained granite</i> from Carlskrona Granitaktiebolag's quarries at Tromtö in Blekinge . . . . .	2,793	2,451	—	2,608
<i>Red-grey fine- to medium-grained granite</i> from the quarries of the same firm at Arpö . . . . .	2,857	2,795	—	2,949
<i>Red-grey granite</i> from the firm Fredrik Holmqvist's stone quarries at Rödeby, Carlskrona . . . . .	2,087	1,882	—	2,141
<i>Red granite</i> from Svenska Granitaktiebolaget's quarries at Vänevik . . . . .	2,646	—	—	—
Marbles and Limestones.				
<i>Kolmård marble</i> from Nya Marmorbruksaktiebolaget, Norrköping <sup>1)</sup> . . . . .	926	—	—	—
<i>Ditto</i> according to another determination <sup>1)</sup> . . . . .	1,038	—	—	—
<i>Mölndbo marble</i> from Mölnbo, parish of Värdinge, Södermanland <sup>1)</sup> . . . . .	905	—	—	—
<i>Ditto</i> <sup>1)</sup> . . . . .	—	—	—	1,174
<i>Lower Silurian Orthoceras Limestone</i> from Fornåsa, belonging to Tornby mekaniska stenhuggeri <sup>1)</sup> . . . . .	1,543	—	—	1,516
<i>Ditto</i> from do. <sup>1)</sup> . . . . .	1,496	—	—	1,403

<sup>1)</sup> The determination is made at the Kungl. Tekniska Högskolans Materialprofningsanstalt at Stockholm.

Marbles and Limestones.	Average crushing strength in $\frac{\text{kilos}}{\text{sq. cm.}}$			
	In a dry state.	In a soaked state.	After having been frozen and tested.	
			In the air.	Under water.
<i>Lower Silurian Orthoceras limestone</i> from Västana lime-works, Borensberg <sup>1)</sup> . . . . .	821	—	—	—
<i>Orthoceras limestone</i> from Gössäter on Kinnekulle in Västergötland <sup>1)</sup> . . . . .	781	—	—	—
<i>Ditto</i> from do. . . . .	1,053	—	—	622
<i>Ditto</i> from do. . . . .	878	—	—	—
<i>Orthoceras limestone</i> from Ulunda, Västergötland <sup>1)</sup> . . . . .	1,100	—	—	540
<i>Orthoceras limestone</i> from Sköfde mekaniska stenhuggeri <sup>1)</sup> . . . . .	1,118	—	—	—
<i>Orthoceras limestone</i> from Bjellum, Västergötland <sup>1)</sup> . . . . .	950	—	—	783
<i>Orthoceras limestone</i> from Yxhult in Närke <sup>1)</sup> . . . . .	741	—	—	—
<i>Ditto</i> from do. . . . .	880	—	—	—
<i>Upper Silurian limestone</i> from Fårösund, Gothland <sup>1)</sup> . . . . .	<sup>2)</sup> 705	—	—	—
<i>Red Upper Silurian limestone</i> from Hall, parish of Fleringe, Gothland <sup>1)</sup> . . . . .	<sup>2)</sup> 685	—	—	—
<i>Grey Upper Silurian limestone</i> from do. <sup>1)</sup> . . . . .	<sup>2)</sup> 1,075	—	—	—
<i>Upper Silurian limestone</i> from quarry in Norderbackar, north of Visby <sup>1)</sup> . . . . .	—	—	—	<sup>2)</sup> 621
<i>Upper Silurian limestone</i> from Kappelshamn in Gothland <sup>1)</sup> . . . . .	—	—	—	<sup>2)</sup> 513
Sandstones.				
<i>Sandstone</i> from Aktiebolaget Ringsjö stensbrott, Hör <sup>1)</sup> . . . . .	874	625	—	480
<i>Sandstone</i> from Aktiebolaget Övedsklosters sandstensbrott <sup>1)</sup> . . . . .	573	—	—	—
<i>Ditto</i> from do. <sup>1)</sup> . . . . .	675	—	—	534
<i>Ditto</i> from do. (used in the New Post-office, Stockholm <sup>3)</sup> . . . . .	672	—	—	622

<sup>1)</sup> The determination is made at Chalmerska Institutets Materialprofningsanstalt at Gothenburg.

<sup>2)</sup> The figures are averages of determinations made partly at right angles to, partly parallel with the layers.

<sup>3)</sup> The determination is made at the Kungl. Tekniska Högskolans Materialprofningsanstalt at Stockholm.

Sandstones.	Average crushing strength in $\frac{\text{kilos}}{\text{sq. cm.}}$			
	In a dry state.	In a soaked state.	After having been frozen and tested.	
			In the air.	Under water.
<i>Gothland sandstone</i> <sup>1)</sup> . . . . .	665	—	—	—
<i>Gothland sandstone</i> from Kvarna quarry in the parish of Vamblingbo, Gothland <sup>1)</sup> . .	767	—	—	822
<i>Gothland sandstone</i> from Burgsvik, parish of Öja, Gothland <sup>1)</sup> . . . . .	714	—	—	773
<i>Visingsö sandstone</i> from quarries, belonging to A.-B. Grenna Sandsten <sup>1)</sup> . . . . .	466	—	—	601
<i>Visingsö sandstone</i> from Trånghalla at the lake Vättern <sup>1)</sup> . . . . .	1,163	—	—	—
<i>Gäfle sandstone</i> from Stockholm's archipelago <sup>2)</sup> . . . . .	844	—	—	947
<i>Ditto</i> from do. <sup>1)</sup> . . . . .	990	—	—	—
<i>Orsa sandstone</i> <sup>2)</sup> . . . . .	571	—	—	601

<sup>1)</sup> The determination is made at the Kungl. Tekniska Högskolans Materialprofningsanstalt at Stockholm.

<sup>2)</sup> The determination is made at Chalmerska Institutets Materialprofningsanstalt at Gothenburg.

## A list of the leading Swedish Firms engaged in the Stone Industry.

*A. Abrahamsson's Stenbrott och Stenhuggeri* at Rörvik in the parish of Åryd, W. district, Blekinge län, close to Merserum station on the Mellersta Blekinge Railway. Owner: A. Abrahamsson. Postal address: Rörvik, Merserum. Value of output 1906: 21,500 kr. Number of workmen: 35.

Manufactures curb and building stones.

*Aktiebolaget Andersson's Mekaniska Stenhuggeri* (founded 1876). Postal and telegraphic address: Mekaniska Stenhuggeriet, Stockholm. Joint capital: 200,000 kr. in shares of 1,000 kr.

Number of workmen: about 60.

All kinds of work in granite, marble, sandstone and limestone. The stone-works, which are situated at Smedsudden (Kungsholmen) at Mälaren, were established in 1860 at Artilleriplan by the mechanician C. Andersson; they were then transferred to Grefturegatan N:o 23, where they remained until shortly before 1900, when they were removed to the place, where they now are. The stone-works possess several stone-planes, stone-saws, lathes, emery and boring machines, grinding-works with different grinding apparatus for granite work, etc. The works are driven by steam-power.

The products have found a market both in and out of Sweden, but the business has, for the present, been abandoned.

*Aktiebolaget Bröderna Flink's Granitstenhuggeri*, Västervik. (Branches at Sundsvall and Gäfle.) Telegraphic address: »Flinks». Postal address: Västervik. Managing director: Fr. Flink. The business was founded in 1881 under the firm C. T. Flink's Stenhuggeri, was reorganised in 1886 as Bröderna Flink's Stenhuggeri and in 1896 as Aktiebolaget Bröderna Flink's Granitstenhuggeri at Västervik. Joint capital: 75,000 kr. in shares of 100 kr. Value of output 1907: 115,000 kr. Number of workmen: 55.

Only so-called black granite for sepulchral monuments is worked. The firm has stone-works, a stone-grindery and sawmills at Västervik with six granite saws, ten rotating grinding machines and one polishing machine with ten polishing plates.

The works are driven by a steam-engine of 16 h. p. and two electric motors of 40 h. p. together. In the stone quarries one steam crane and six hoisting cranes of 10 h. p., worked by hand, are used.

The products find a market mainly in Sweden and Denmark, and latterly they have also begun to find their way to America.

*Aktiebolaget Bårstad Kalkstensbrott, Stenhuggeri och Sliperi* in the parish of Rogslösa, Östergötlands län. Postal address: Borghamn.

Manager: Joël Nelson.

Value of output 1906: 34,107 kr.

Number of workmen: 48.

Manufactures building stone of *Orthoceras* limestone.

*Aktiebolaget De Förenade Stenhuggerierna*. Postal and telegraphic address: Dyne, Strömstad. The business was founded in 1894, was re-organised in 1903 as a Company under the above name with a capital of 639,360 kr. in shares of 54 kronor. Board of directors: H. A. Rogstad, Hans J. Bakke and Chr. Aug. Krebs.

Value of output 1907: 98,040 kr. Number of workmen: about 350.

Manufactures chiefly curb and paving stones. The company owns numerous stone quarries and stone-works in the district around Strömstad, in the parishes of Skee, Hogdal, Nälinge, Lommelanda, Tjärnö, Lur and Tanum in the district of Norrviken, Göteborgs and Bohus län. It works Bohuslän granite of various colours: grey, dark-grey, blue-grey, and red-dish-grey.

The products of the Company find a market in Denmark, Germany, Holland, Belgium, France, England, the West Indies and South Africa.

*Aktiebolaget Grafmonument Industri* (founded 1902). Office: Centralpalatset. Postal and telegraphic address: Stockholm. Joint capital: 60,000 kr. in shares of 250 kr. Managing director: B. F. Burman.

Value of output annually: 50,000 kr. Number of workmen: 10—15.

Manufactures sepulchral monuments of black and grey granite, as well as of other stones. The stone-works are situated at Solnadal, Stockholm.

The products are exported to Holland, Germany, Africa and other countries.

*Aktiebolaget Grenna Sandsten* (founded 1899). Postal and telegraphic address: Grenna. Managing director: V. Egnell, burgomaster. Joint capital: minimum 25,200 kr., maximum 75,600 of which 52,800 kr. have been paid up.

Value of output: 1907: 8,000 kr. Number of workmen on an average: 10.

The Company rents sandstone quarries 5 km. from Grenna and quarries both large and small blocks, intended for facade lining; manufactures rubble, pavement stones, step stones, tombstones, and portal stones.

The works are driven by steam-power and a petroleum motor.

The products find a market within Sweden, mainly in Scania.

The Company was awarded an honorary medal for its products at the Industrial Exhibition at Norrköping in 1906.

*Aktiebolaget Gusta Stenhuggeri* in the parish of Brunflo. Postal address: Östersund. Manager: L. T. Ellström.

Value of output 1906: 40,000 kr. Number of workmen: 25.

Manufactures curb stones, building stones and sepulchral monuments of Jämtland *Orthoceras* limestone. The stone-works have one stone-saw, three stone-planes, and one stone-grinding and polishing machine.

The works are driven by one steam-engine and steam-turbine.

*Aktiebolaget Grönhögens Stenhuggeri och Kalkbruk.* The business was founded in 1906. Stone-works and lime-works in the parish of Ventlinge, Ölands S. Mot's district, Kalmar län, 6 km. from the south point of Öland and 9 km. from the steam-boat station Degerhamn. Joint capital: 35,000 kr. in shares of 50 kr. Managing director: Lorentz Peterson. Foreman: Gustaf Nilsson. Postal address: Grönhögen, Ventlinge.

Value of output 1906: 6,000 kr. Number of workmen: 12.

Manufactures lime, slacked and unslacked, for agriculture (and building), facade and paving stones, as well as dressed and polished landings.

The works are driven by a steam-engine of 150 h. p.

A stone-plane and a stone-grinding machine are used.

*Aktiebolaget Gunnerson's Stenhuggerier.* Postal address: Lysekil. Telegraphic address: Gunnerson, Lysekil. Managing director: Vice-Consul J. G. Gunnerson. The Company took over in 1903 the stone-cutting business, carried on since 1894 by the engineer J. G. Gunnerson in Bohuslän. Joint capital: 220,000 kr. in shares of 500 kr.

Value of output 1907 (f. o. b.): 436,250 kr. Number of workmen: about 350.

Manufactures rough blocks, paving, curb and building stone of Bohuslän granite.

The Company owns stone-works in the town of Lysekil, and in the parishes of Lyse, Brastad, Askum and Tossene in the district of Sunnerviken, in Göteborgs and Bohus län. At Ramsvik, Skalhamn, in the parish of Lyse, where the stone-quarry lies quite close to the sea-shore, the quarrying is conducted on thoroughly rational lines. Pneumatic boring-machines and steam-cranes are employed.

*Aktiebolaget Hilleviken.* Postal address: Svartmangatan 16<sup>II</sup>, Stockholm. Telegraphic address: Hilleviken, Stockholm.

The Company was founded in 1883. Joint capital: 80,000 kr. in shares of 1,000 kr.

Managing director: A. G. Forselius.

Value of output 1907: 203,092,82 kr. Number of workmen: average 110.

The Company manufactures not only building stones, plinths, steps, and front stones, building stones for quays and bridges, but also polished works, such as pedestals, columns, and sepulchral monuments, etc.

The stone which is worked is (1) red, medium-coarse, even-grained granite from Vätö in Roslagen, (2) grey, small-grained granite from Hilleviken in the parish of Hillersjö, Stockholms län, (3) grey, coarse-grained, even-grained granite from Åsberget near Örnköldsvik.

The stone-works which are owned by the Company, are situated at Olofsberg and Björkängen in Vätö; at the first-mentioned place a stone-grindery has also been established.

Steam-power is used for driving the machine-saws and grinding machines, and at the quarries steam- and motor-cranes are employed.

*Aktiebolaget Hummersbergs Nya Stenhuggeri,* Stockholm, Igel-damsgatan 6. The business was started in 1898 by J. H. Larsson and Ludvig Ström under the firm Ludvig Ström & Co. In 1900 J. H.

Larsson withdrew from the business and was succeeded by John Apelgrén, whereupon the name of the firm was altered to Ström & Apelgrén's Mekaniska Stenhuggeri; in 1904 the business was taken over by the newly formed Company Hummersbergs Mekaniska Stenhuggeri, and in 1905 by the present owner. Joint capital: 38,000 kr. in shares of 250 kr. Managing director: Eric Svanberg, architect.

Value of output: 120,000 kr. Number of workmen: 30.

The Company manufactures steps, fireplaces, tables, washstands, etc. of marble (also of Italian and Belgian marble).

A petroleum motor of 18 h. p., working three machines, is employed.

*Aktiebolaget Lanna Stenhuggerier.* Postal and telegraphic address: Hidingebro. Office at Stockholm, Odengatan 76. The firm, founded in 1880 under the name of Lanna Stenhuggerier, was in 1901 taken over by Kommanditbolaget Lanna Stenhuggerier, C. Vogel and Co., and in 1906 passed to the present owner: Aktiebolaget Lanna Stenhuggerier; the firm embraces also Strömsborgs Mekaniska Stenhuggeri Aktiebolag (founded 1898) and Tångsätters Stenhuggeri (founded 1898). Manager: Elliot Eriksson. Joint capital: 200,000 kr. in shares of 250 kr. Value of output 1906: 275,162 kr. Number of workmen: 222.

Furnishes only ready-made work (sometimes also rough stone), such as fine- and coarse-planed limestone fronts, paving, curbs, steps, slabs for mangles and tables, and sepulchral monuments, all of Närke limestone.

The stone-works are situated at Lanna in the parish of Hidingebro and at Tångsäter in the parish of Asker, in Örebro län.

The stone-works employ stone-planes, lathes, hoisting cranes, etc. which are driven by water, steam and electric power, aggregating 120 h. p. Lanna has its own railway track and loading place (named »Lanna Bruk») on the Örebro and Svartå railway.

The products find a market within Sweden and to a slight extent in Denmark (Copenhagen).

*Aktiebolaget Lemunda Sandstensbrott.* Telegraphic address: Lemundabolaget, Motala. Postal address: Lemunda, Motala. Manager: Olof Falén. Joint capital: 270,000 kr. in shares of 300 kr. The business was founded about 60 years ago by the gentleman farmer A. P. Olofsson, and was reorganised in 1899 as a Company under the above name.

Value of output 1907: 107,600 kr. Number of workmen: average 70.

The Company owns the estates of Lemunda, Lemingstorp (Lemunda torp), Lilla Hals and Näs, the two first in the parish of Motala, the last in the parish of Västra Ny, Östergötlands län, at the lake Vättern.

On these estates the celebrated Lemunda sandstone is quarried.

The manufacture consists of defibrating stones (»defibrörstenar») for manufacture of white and brown, cold and hot ground wood-pulp, refining stones (»raffinörstenar»), grindstones for grinding iron and steel in works, manufacturing files, scythes, axes, spades, nails, saw-blades, etc., millstones, building stones, debris (so-called sandstones flakes) for rolling-mills and founderies, quartz-sand for the manufacture of fine and coarse glass, and grinding-sand.

The chief quarries are: Lemunda norra, where both white and yellow

sandstone is quarried (qualities 1—12), Lemunda södra (quality AB, NB and SB), Lemingstorp (quality LB), Hals (quality LH) and Näs (quality N). The sand-pits are: Näs (quality No 1 »sjötvättad» and quality No 2 »bankrenad») and Hals (quality LH).

The works are driven by suction gas plant of 60 h. p.; and possess also two stone-lathes, stone boring-machines for steam and compressed air, circular saws, 10 tons travellers, hand cranes, fixed and transportable, electric blasting apparatus, petroleum motor with rotary pump for pumping dry, tool smithy with various fixed machine-tools. The Company also owns the passenger steamer »Frey», plying on the route from Motala via Vadstena to Askersund and three sailing vessels, averaging 300 tons. Landing-stage and quays at Lemunda and Näs.

All the products are exported to Norway, Finland and Russia. The Company's products were awarded a prize at the Industrial Exhibition at Norrköping 1906.

*Aktiebolaget H. L. Liepe & Son*, Gothenburg, Friggagatan 13. Postal and telegraphic address: Gothenburg. Managing director: Erik Liepe, engineer. Joint capital: 61,000 kr. in shares of 1,000 kr.

Value of output 1906: about 100,000 kr. Number of workmen: average 60.

Manufactures rough blocks, coarse and fine building stone and sepulchral monuments of granite, and furnishes all kinds of marble for furniture fittings.

Owens quarries of Bohuslän granite in Köön near Bovallstrand and of red porphyritic gneiss at Mollösund, both situated in Bohuslän. The raw material is worked in stone-works, situated, some at the quarries, some at Gothenburg, where the firm has a modern grindery with about ten different kinds of grinding-machines, a large saw, and air-compressors for pneumatic chisels which latter have been found eminently serviceable for ornaments and sculptures in granite. The works are driven by steam of 10 h. p.

The products find a market in Scotland (Aberdeen, rough blocks) and in Sweden.

*Aktiebolaget Merserums Stenhuggerier* (founded 1898). Postal address: Merserum. Joint capital: 12,000 kr. in shares of 100 kr. Board (registered at Kalmar): J. Nilsson (managing director).

Value of output 1906: 145,915 kr. Number of workmen: about 175.

The Company has stone-works in the parishes of Mjellby, Helleryd and Åryd, Western district, Blekinge län; the Company, moreover, owns Sandviks Mekaniska Stenhuggeri in the parish of Persnäs, Ölands N. Mot's district, Kalmar län, near the harbour of Sandvik on the east coast of Öland.

Manufactures paving and curb stones, facade and other building stones, and ornamental work of limestone and sandstone. At the Sandvik stone-works there are two stone-planes. Manager: P. Nielsén. Postal address: Persnäs.

The works are driven by steam, 10 h. p.

*Aktiebolaget Mollén's Granitförädlingsverk*, Gothenburg. The Company owns Hölje quarries, stone-works and stone grindery in the parish of Jämshög, Blekinge län (manager: R. E. Littsman), and Såganäs

quarry in the parish of Stenbrohult, Kronobergs län (manager: G. A. Johansson).

Manufactures block stones and polished work. Value of output 1906: 48,950 kr. Number of workmen: 35.

At Hölje a water-turbin of 75 h. p. is used for driving two electric generators of 30 h. p.; further there are two electric motors, one stone-saw and thirteen stone grinding and polishing machines. At Sâganäs there is a petroleum motor of 5 h. p.

*Aktiebolaget Orsa Stenhuggeri* (founded 1902). Joint capital: 140,000 kr. in shares of 500 kr. Managing director: E. Kjellström. Postal address: Mässbacken.

Value of output 1906: 17,140 kr. Number of workmen: 15.

Stone-works in the parish of Orsa, Ofvan-Siljan district, Kopparbergs län, at Mässbacken station on the Dala and Hälsingland railway, 10 km. from the municipal community of Orsa. Manufactures front-works as well as grind-stones and millstones, etc. The stone-works have six stone-saws, stone-machines, grinding-machines and boring-machines, etc..

The works are driven by a gas-motor of 50 h. p., besides a steam-engine of 25 h. p. for a lifting crane.

*Aktiebolaget Ringsjö Stenbrott*, Hör. Telegraphic address: Stenbrottet, Hör. Manager: Alfred Thorén. The Company was founded at the beginning of the year 1899. Joint capital: 125,000 kr. in shares of 500 kr.

Value of output 1906: 26,651 kr. Number of workmen: 16.

Works the sandstone deposits at Stanstorp quarries on the domain of Bosjökloster at the lake Ringsjö, 5 km. from Hör railway station in Scania, and furnishes both rough blocks and ready cut stone, as well as millstones and grindstones which latter are sent mainly to the wood-pulp mills under the name of defribating and refining stones (»defibrör- och raffinör-stenar»). Debris is worked up into macadam, especially for concrete.

For the transport mainly of debris (»stone chips») there is a Decauville line, 5 km. in length, from the quarry to Hör railway station. Further there is a steam-crane of 30 tons h. p.

The markets are Sweden, Denmark, Norway, Finland and Russia.

The Company's products were awarded a prize and a bronze medal at Norrköping 1906, and a prize and a silver medal at Lund 1907.

*Aktiebolaget Syenit*, Stockholm. Telegraphic address: »Syenit». Postal address: Stockholm. Managing director: H. Jæger. The Company was founded in 1897. Joint capital: 495,000 kr. in shares of 250 kr. Value of output 1907: about 250,000 kr. Number of workmen: about 200.

Manufactures rough blocks and building stones of different granites. At present, the Company is working the following quarries: »black granite» at Målaskog on the line from Vislanda to Bolmen (Ljustorp, Granhult, Målensås); »black granite» at Brännarebygden on the Elmhult and Sölvesborg line; »blue-black granite» in the Karlshamn skerries at Heleneborg and Sternö; red granite at Vånga, close to the line from Kristianstad to Immeln from which the Company exports rough blocks on a large scale to Scotland. Further, the Company owns granite-occurrences at Lamhult station on the State

railway, as well as in the Ångermanland archipelago in the parish of Vi-byggerå and in Ulfön.

The various machines are driven by steam, and steam-cranes are employed.

Export to Germany, England, Austria, Switzerland, Russia and Roumania.

*Aktiebolaget Övedsklosters Sandstensbrott.* Postal and railway station: Öved. Telegraphic address: »Övedssten, Malmö». Manager: C. G. Zickerman. Joint capital: 160,000 kr. (maximum 300,000 kr.) in shares of 500 kr. Value of output 1907: 280,000 kr. Number of workmen: about 100.

The Company engages mainly in the quarrying and working of the light-red Silurian Övedskloster sandstone. As a general rule no rough stone is sold, only ready worked facade stone. The quarrying takes place in a mine (60 m. deep) and not with open shaft. A railway, 4 km. long, leads from Öved station on the Landskrona, Keflinge and Sjöbo line to the quarry. The works are driven by a suction-gas generator of 80 h. p., a petroleum motor of 30 h. p. and also, during nine months out of the twelve, by water-power of about 40 h. p. The latter is transmitted by means of electricity or compressed air to the mine, the saws, etc. (during the three months, when the water supply is low, the electric works are driven by petroleum).

The hewing of rough stone is carried on by hand, partially aided by stone-saws, grinding-machines and lathes.

The products find a market mainly within Sweden, but have also been sent to Denmark; small quantities of rough stone have been sold to Holland.

*Almnäs Granitbrott*, parish of Tveta, Stockholms län. Postal and telegraphic address: Almnäs. Owner: Justus Hellsten. Value of output 1906: 7,837 kr. Number of workmen: 8.

Quarrying of granite which is a fine-grained and grey-blue Stockholm granite, has been carried on for 10 years on a minor scale. It is sold mainly in rough blocks, but is also fashioned into paving and rubble stones with a market in the locality, as well as in the towns of Stockholm, Södertälje, Strängnäs and Eskilstuna.

*Oscar Aminoff's Stenhuggeri*, Norrköping. Value of output 1906: 12,253 kr. Number of workmen: 2.

Manufactures building stones, etc.

*Cath. Bang's Stenhuggerier* in the parishes of Näsing and Skee, Norrviken district, Göteborgs och Bohus län. Owner: Cath. Bang, merchant. Owner's telegraphic address: Cathinco, Kristiania. Postal address: Kristiania. Value of output 1906: 56,962 kr. Number of workmen: 89.

Manufacture curb and paving stones.

*N. S. Beer & Co.*, Kristiania. Stone-works in the districts of Norrviken and Sunnerviken, Göteborgs och Bohus län. Manager: Simon Olsson. Postal address: Uleberg, Hunnebostrand.

Value of output 1906: 334,105 kr. Number of workmen: 371.

Manufactures curb, paving, and building stones.

*Carl Berglund*, Karlshamn. The firm owns stone quarries and stone-works in the parishes of Åryd, Hällaryd, and Asarum in Blekinge län, as well as in the parish of Askum, Göteborgs och Bohus län.

Value of output 1906: 264,550 kr. Number of workmen: 197.

Manufactures paving stones.

*Betonbolaget S. Henrikson & C:o*, Varberg. Telegraphic address: Betonbolaget. Director: Gustaf Magnusson. The business was founded in 1900, by O. Rikoff, manufacturer, and in 1908 passed into the possession of the present Company.

Value of output 1907: 20,000 kr. Average number of workmen: 12.

During the last few years the Company has restricted itself to the fabrication of macadam for which granite debris from the manufacture of paving stones is utilised (green granite No 1). The quarries are situated at Varberg and are called »Fästningsberget».

The motive power is supplied by a steam-engine and steam-crusher.

Market mainly in Denmark and Germany, to a slight extent within Sweden.

*Blekinge Granitindustri Aktiebolag*. Telegraphic address: Granit-industri, Karlshamn. Postal address: Karlshamn. The Company was founded in 1896. Joint capital: 350,000 kr. in shares of 500 kr. Managing director: Herman Koch. From 1905 up to the present the business has been stopped.

*Blomsholms Stenhuggerier*. Postal address: Strömstad. Telegraphic address: »Granit», Strömstad. The business was founded in 1900 and is owned by the firm Blomsholms Stenhuggerier, Hessel & Co. The owners of the firm are Oscar Hansson and Arthur Hessel, the latter being manager.

Value of output 1907: 100,000 kr. Number of workmen: 75.

The manufacture consists mainly of street curbs and roughly dressed sets.

The largest and most important quarries of the firm are situated on the estates of Stene and Blomsholm in the parish of Skee, Norrviken district, Göteborgs och Bohus län. The products are taken in England, Germany, Denmark, and other countries.

*Bohuslänska Granitkompaniet*. Postal address: Strömstad. Telegraphic address: »Hessel, Strömstad». The business was founded in 1902. Owners: Arthur Hessel and A. F. Larsson.

Value of output 1907: 185,000 kr. Number of workmen: 75.

The manufactures of the firm are dressed paving stones and curb stones. The quarries are situated in the parishes of Skee, Lur, and Tanum in the district of Norrviken, Göteborgs och Bohus län.

The products are taken in Denmark, Germany, England, Russia, and other European countries, besides which small lots have been placed on markets outside Europe.

*Borghamns Kalkstensbrott*, parish of Rogslösa, Östergötlands län. Postal and telegraphic address: Borghamn. Owner: the Swedish State. Manager: R. Andersson, shaft-master. Value of output 1907: 26,432 kr. Number of workmen: 35.

The quarry has been in work for the account of the State ever since 1844 at which time it was sold by Göta Kanalbölag, and the stone was at first used exclusively for the fortress of Karlsborg, whereas now it is sold to private persons. The output consists of rough stone for foundations and cellars, cut and planed stones for footpaths, flags, plinths, quay and pier stones, steps, inner and outer wall lining stones, table slabs of every description, sepulchral monuments, whet- and millstones, well-tubes and hearthstones. Both red-brown and grey *Orthoceras* limestone is quarried.

The motive power is a 2 h. p. locomobile, and two stone-planing machines are used. The products are sold only within Sweden.

*Brandtbergs Stenhyfleri och Kalkbruk*, parish of Våmb, Skaraborgs län. Owner: A. J. Brandt.

Manufacture of planed and hewn limestone (value of output 1906: 2,100 kr.), as well as lime. The motive power is supplied by a petroleum motor of 6 h. p., and two stone-planes are used.

*Brücke Stenhuggeri*. Owners: J. and A. Nielsen, Packhusgatan 2 (Herzia), Gothenburg. Telegraphic address: Nielsen's, Gothenburg. The firm was founded in 1884 by A. C. and J. M. Nielsen, and is now owned by A. C. Nielsen and Mrs Frederikke Nielsen. Value of output (f. o. b. Sweden) 1907: 700,000 kr. Number of workmen: 550.

The firm manufactures paving, curb and building stones of Bohuslän granite, in colour reddish and grey of several shades; it owns quarries and stone-works in the district of Sunnerviken, Göteborgs och Bohus län, the most important of which are: Hunnebostrand and Bovallstrand quarries in the parish of Tossene, all kinds of building stones, worked curbstones, and rough blocks, etc.; Lahälla and Vinbräcka in the parish of Brastad; Vrångebäck, Rågårdsdal, and Ed in the parish of Bro; Sjöbol and Hanvik, and Risdal in the parish of Askum (paving stones).

About twenty large cranes are used for hoisting the blocks at the quarries and at the loading places.

Most of the products are sold to Sweden, Denmark, Germany, Great Britain, Holland and other European countries.

*Bränskulla Stenbrott*, parish of Hjärsås, Kristianstads län. Postal address: Immeln. Owner: Anders Persson & Barnen. Manager: Karl Larsson. Quarry of »black granite».

Value of output 1906: 29,000 kr. Number of workmen: 27.

Motive power: one steam-engine and steam-turbine.

*Bröderna Gustafsson*, Hjortsberga, parish of Vårdinge, Stockholms län. Postal address: Mölnbo. The business was founded in 1891 by the ornamental sculptors Karl Gustaf and Viktor Gustafsson. In 1893, the work at Mölnbo was commenced and is now being carried on under the above firm. Manager: B. Gustafsson, Garfvaregatan N:o 3, Stockholm.

Value of output 1907: 30,000 kr. Number of workmen: about 15.

The manufacture consists of green Mölnbo marble for house fronts, inner wall lining stones, balustrades, pillars, pedestals, fire-places, tombs, fonts

and other polished or merely dressed works. The stone is quarried at the firm's own quarries at Hjortsberga.

The motive power is a petroleum motor, and saws, lathes, etc. are used for working the stone. The firm has its chief market in Stockholm, but its products have also been taken in other parts of Sweden.

The products have been awarded prizes.

*Bröderna Styrenius Stenhuggeri.* Postal address: Västervik. Owners: Carl, David and Reinhold Styrenius. The business was founded in 1897.

Value of output 1907: about 30,000 kr. Number of workmen: 12.

The firm manufactures sepulchral monuments, both polished and unpolished.

The raw material is the common so-called black Västervik granite; but red and blue granite is also worked. The black granite is quarried in the neighbourhood of Västervik, the red at Hultö, Loftahammar, while the grey consists of blocks from the vicinity of Stockholm.

The motive power is a petroleum motor of 4 h. p., and a stone-saw, two grinding and polishing machines and a sandblast are used for working the stone. Market within Sweden.

*Carlskrona Granitaktiebolag.* Telegraphic address: »Granitbolaget». Postal address: Karlskrona. Managing director: Alfred Svenson. The firm was founded in 1897. Joint capital: 60,000 kr. in shares of 500 kr. Value of output: about 250,000 kr. per annum. Number of workmen: 200.

Manufactures paving stones. Own quarries and stone-works in the parishes of Asarum, Mörrum, Gammalstorp, Elleholm, Hällaryd, Bräkne—Hoby, and Ölgehult, Western district, and in the parishes of Backaryd, Ronneby, Edestad, Listerby, Fölkärle, Nätraby, Hasslö, Aspö, Ramdala, and Jämjö in the Eastern district, Blekinge län.

*Anders Carlson's Stenhuggeri,* Lysekil. Telegraphic address: Carlson, Lysekil. The business was founded in 1892. Value of output 1907: about 60,000 kr. Number of workmen: 60.

Manufactures mainly paving stones. Owns quarries in Lysekil and in the parish of Lyse, Göteborgs och Bohus län. The rock consists of Bohuslän granite.

Market within Sweden and export to Denmark and Germany.

*Frans Carlsson's Stenhuggeri och Sliperi,* Norrköping.

Value of output 1906: 18,000 kr. Number of workmen: 16.

Manufacture of building stones and polished and unpolished sepulchral monuments. The motive power is a gas-engine of 5 h. p.; one stone-saw and two stone grinding and polishing machines are used.

*Claëstorp's Marmorbruk,* parish of Östra Vingåker, Södermanlands län. Owner: Count Claës Lewenhaupt, Claëstorp.

Value of output 1906: 11,500 kr. Number of workmen: 17.

Manufacture of marble blocks and slabs.

The works are driven by a water-wheel and water-turbine of 10 h. p. and a steam-engine and steam-turbine of 4 h. p.

*Älfdalens Nya Porfyrverk*. Postal address: Älfdalen. Owner: F. A. Andersson. Number of workmen: 3.

At the porphyry works are manufactured urns, vases, candlesticks, boxes, paper-weights, knife-hafts, brooches and studs, etc. of porphyry and other stones.

*Eliasson & Johansson*. Owners: J. A. Eliasson and M. A. Johansson. Postal and telegraphic address: Varberg.

Value of output 1906: 94,320 kr. Number of workmen: 114.

The firm owns quarries in the town of Varberg, the Tångaberg stone-works in the parish of Torpa, Hallands län, and stone-works in the parish of Askum, Göteborgs och Bohus län. Manufacture paving stones.

*Ericsson & Kjellström's Mekaniska Stenhuggeri*, Värtan, established 1895. Owner: Gid. Ericsson. Telegraphic address: Ericström, Värtan. Postal address: Värtan. Head-office at Stockholm: Sibyllegatan 11. Factory office: Värtan.

Value of output annually: 200,000 to 300,000 kr. Number of workmen: 60.

Manufacture of lining stones, cornices, sculptures, ornaments, ornamental doorcases and entrances, fire-places, etc., in granite and marble and, as a speciality, works in red and light-grey sandstone.

The stone-works have two machine-saws, a stone-plane and a lathe, driven by a gas-motor of 22 h. p.

The products are sold chiefly within Sweden, but are also exported to Finland.

At the Industrial Exhibition at Stockholm 1897 the stone-works were awarded a silver medal.

*Eriksbergs Stenbrott, Stenhuggeri och Sliperi* in the parish of Åryd, Blekinge län. Postal address: Merserum. Owner: E. Jeppson, Eriksberg. Value of output 1906: 56,700 kr. Number of workmen: 60.

Manufactures paving and curb stones, and unpolished works of Blekinge granites and gneisses.

*R. & S. Falch's Stenhuggerier*. Postal address: Helle, Lommelanda, Göteborgs och Bohus län. Owners: Ragnvald and Sverre Falch at Fredrikshald (Norway). Manager: Ragnvald Falch. The firm was founded in 1872 by M. Falch at Fredriksstad and was taken over by his sons, the present owners, in 1887.

Value of output 1906: 57,655 kr. Number of workmen: 67.

Manufacture of paving, curb and building stones.

The quarries of the firm are situated within the granite fields in the parishes of Näsinga and Lommelanda, Norrviken district, Göteborgs och Bohus län.

Export mainly of curb stones to England, Germany, Belgium and Holland.

*A. K. Fernström's Stenhuggerier*, Karlshamn. Telegraphic address: Fernström. Postal address: Karlshamn. Owner: A. K. Fernström, engineer.

The business was founded in 1885 and was extended in 1907 by the purchase of the majority of shares in Svenska Granitindustri- och Skeppsrederi-aktiebolaget F. H. Wolff, Karlskrona (see below).

Value of output 1907: about 1,000,000 kr. Number of workmen: about 900.

Manufacture of blocks, paving, curb and building stones, small sett paving stones (»Kleinpflaster») and macadam.

The firm owns quarries of »black granite» at Björkeröd, Immeln and Häggshult in Scania and at Elmhult in Småland; of dark-blue Karlskrona diabase (»syenite») in Sternö in Blekinge; of red granite (termed »Virgo») in Kalmar Sound; moreover a number of quarries of Blekinge, Vånevik, and Bohuslän granite for the manufacture of paving and house-building stones. The quarries and stone-works are situated in the parishes of Hällaryd, Asarum and Kyrkhult, Western district, and in the parishes of Ronneby, Sturkö, Hasslö, Aspö, Listerby and Nättraby, Eastern district, Blekinge län; near the country-town of Påskallavik in the parish of Döderhult, Norra Möre and other districts, Kalmar län; in the parish of Stenbrohult, Allbo district, Kronobergs län; in the parishes of Glimåkra, Hjarsås and Örkene, Eastern and Western Göinge district, Kristianstads län; near the town of Lysekil, and in the parishes of Lyse, Brastad and Bro, district of Sunnerviken, Göteborgs och Bohus län.

For the transport of black granite blocks the firm possesses a 20 km. long railway from the quarries to the railway line from Sölvesborg to Elmhult and four steamboats for exporting the stone. For the manufacture of small sett paving stones and macadam there are several splitting machines and stone-crushers.

The products are exported chiefly to North Germany, but also to Holland, Russia, England and Denmark.

*Fjällbacka Stenhuggeri Aktiebolag* (founded 1904). Joint capital: 10,000 kr. in shares of 10 kr. Board of directors: F. S. Petersen, Viktor Kullgren, and B. Truedsson. Manager: B. Truedsson. Postal and telegraphic address: Fjällbacka.

Value of output 1906: 206,400 kr. Number of workmen: 179.

The stone-works are situated in the parishes of Kville and Tanum, Norrviken district, Göteborgs och Bohus län, close to Fjällbacka harbour.

Manufacture of paving and curb stones.

*C. G. Flink's Stenhuggeri och Sliperi*, Västervik. Owner: C. G. Flink.

Value of output 1906: 49,460 kr. Number of workmen: 20.

Manufacture of polished work. The motive power is a petroleum and benzine motor of 8 h. p., besides which two stone-saws and four stone grinding and polishing machines are used.

*Fredriksstads Stenhuggerier* in the parishes of Askum and Tossene, Sunnerviken district, Göteborgs och Bohus län. Manager: Pehr Sörensen, Fredrikstad, Norway. Steward: A. E. Carlsson. Postal address: Sveneröd, Hunnebostrand.

Value of output 1906: 207,120 kr. Number of workmen: 105.

Manufacture of paving and curb stones.

*John Freeman & Son's Stenhuggeri Aktiebolag.* Postal address: Lysekil. Telegraphic address: Gunnerson. The Company was founded in 1903. Joint capital: 54,000 kr. in shares of 100 kr. Managing director: Vice-consul J. G. Gunnerson.

Value of output 1907: 82,900 kr. Number of workmen: about 75.

Manufacture of paving, curb and unpolished building stones, etc.

The Company owns stone-works at Uleberg harbour in Bohuslän.

*Frösunda Stenbrott, Stenhuggeri och Sliperi* in the parish of Solna, Stockholms län.

Owner: Fritz Johansson, Finnstugan, Haga, Stockholm C.

Value of output 1906: 30,750 kr. Number of workmen: 14.

Manufacture of paving and curb stones of Stockholm granite.

*Garpedans Stenhuggeri,* Gamleby. Owner: Aktiebolaget Ankarsrums bruk, since 1891. Telegraphic address: »Bruket, Ankarsrum». Postal address: Gamleby. Manager of the stone-works: Sven Olsson.

Value of output 1907: 30,000 kr. Number of workmen: about 38.

Manufacture of paving and curb stones with a market chiefly in Germany: Hamburg, Kiel, Königsberg, Danzig, Stettin, Berlin and other towns. The stone-works are situated in the parish of Lofta, close to the country-town of Gamleby and to Gamlebyviken, Kalmar län.

*Gottlands Slipstensbolag,* Hugo Hansén & C:o. Postal address: Burgsvik. Telegraphic address: Slipstenbolaget, Visby. The firm was founded in 1873 by Victor Hansén, J. F. Jacobsson and consul Adolf Claudelin, and has been owned since 1903 by Mrs Fanny Hansén of Visby and Hugo Hansén of Burgsvik, the latter being the head of the firm.

Value of output 1907: 98,500 kr. Number of workmen: about 100.

The stone worked is exclusively Gothland sandstone from which grind-stones and block-stones for building purposes are chiefly made; besides which rough sandstone is exported for grinding of marble. The quarries are situated in the parishes of Gröttlingbo, Fide, Öja, Vamlingbo and Sundre in the south of Gothland. Most of the quarries are rented.

No other machines are used for the work but hand-cranes, wind and petroleum motors.

The products find a market in Sweden, Norway, Denmark, Germany, Russia, Finland, Holland, Belgium, and France. Occasionally small lots have been exported to Africa and South America.

The Company's products have been awarded medals at Philadelphia, Stockholm, Paris, Visby and Norrköping.

*Grafversfors Stenhuggeri och Sliperi.* Postal address: Grafversfors. Telegraphic address: »Stensbruk, Norrköping». Owner: Stens Bruks Aktiebolag, Finspång. Managing director: Kristoffer Hult.

Grafversfors Stenhuggeri och Sliperi was started in 1876 with Jonsbergs Stenhuggeri Aktiebolag as owner and has since 1880 had the following Owners: Carl Ekman, manufacturer, Finspång; Aktiebolaget Finspångs Styckebruk, and now, since 1903, Stens Bruks Aktiebolag, Finspång. It

has, however, always gone under the name of »Grafversfors Stenhuggeri och Sliperi».

Value of output 1907: about 120,000 kr. Number of workmen: about 130.

The firm works: 1) green marble, known as »Kolmård marble», 2) white marble, termed »Ekeberg marble», 3) several different granites from the district of Grafversfors in Östergötland. The marble quarries are situated at Gropptorp, in the parish of Vingåker, Södermanland, and at Ekeberg, in the parish of Glanshammar, Närke. The manufacture consists mainly of blocks of red granite (N:o 1) which are exported to Scotland, but also of building stones (plinths, wall lining stones, etc.), flagstones, steps, inner wall linings, fire-places, slabs, plates for electric mounting, turned and polished rollers of granite, etc.

The motive power is supplied by a number of mechanical appliances, such as steam-cranes, stone-planes, grinding machines, stone-saws, stone-lathes, etc. The products of the stone-works have been awarded medals and diplomas at several exhibitions, both in Sweden and abroad, amongst others at Madrid, Blida, Liverpool, Saltair, Copenhagen, Chicago, Paris.

*Granitaktiebolaget C. A. Kullgren's Änka*, Uddevalla. Postal and telegraphic address: Kullgren's, Uddevalla. Managing director: Viktor Kullgren. The business was founded in 1842 by Baron Nils Ericson and C. A. Kullgren, merchant. The firm was reorganized in 1891 into a Company under the above name.

Joint capital: 450,000 kr. (maximum 600,000 kr.) consisting of shares of 500 kr. each. Value of output 1907 (f. o. b. Sweden): 200,000 kr. Number of workmen: about 1,200.

The production consists of dressed stone of every description and dimension, curb stones, building granite of all kinds, such as granite for bridges and quays, house facades, basements, steps and staircases, etc., dressed granite blocks (so-called rough blocks of granite), to supply the requirements of foreign grinders, and, further, polished works, such as sepulchral monuments, pillars, pedestals, etc. The firm owns numerous quarries and stone-works, situated at different places round the coast of Sweden, from the north of Bohuslän to north of Oskarshamn, and utilises rocks of various qualities and appearances. The chief quarries and stone-works which use Bohuslän granite are the following: Malmön near Lysekil, where light-grey granite (N:o 15 and N:o 15 G) and red-grey granite (N:o 3) are quarried; quarries and stone-works within the parishes of Bottna and Svenneby (red granite N:o 45) and Svarteborg (blue-grey granite N:o 50 and N:o 50 B); further quarries at Lysekil and within the parishes of Lyse, Bro, Brastad, Askum and Tossene. In Hallands län the firm owns quarries in the districts of Varberg (green granite N:o 1) and Falkenberg and within the parish of Träslöf, in Kristianstads län, within the parishes of Gedenryd, Hjärsås, Fjälkestad, and others (black granite N:o 30), and in the district round Karlskrona and Oskarshamn. »Black granite», moreover, is quarried at Hjortsjö, in the district of Rydaholm in Småland (N:o 30 H) and at Vilshult in Blekinge. A blue-black diabase (N:o 38) is quarried in the central part of Blekinge.

The works are driven by steam, and 30 steam-cranes with enormous hoisting capacity, wind-motors, etc. are in use. In the district of the chief stone-works, in the island of Malmö, a railway, worked by locomotive power, was built in 1907.

The Company's products have had for generations a steady market in almost all European countries (Germany, Denmark, England, Holland, Austria, Sweden, Russia, etc.), and have now also begun to be introduced into trans-European lands. The sale of sepulchral monuments and polished works is confined to the less important home market, as almost all foreign countries have placed prohibitive tariff duties on these articles. The Company's products have been awarded gold, silver, and bronze medals both in Sweden and abroad, in London, Moscow, Vienna, Philadelphia, Paris, Brussels, Madrid, and elsewhere.

*Grythytte Skifferverk.* Postal address: Grythytted. Telegraphic address: Nora. Owner: Stadra Aktiebolag. Joint capital: 260,900 kr. Manager: Carl Eb. Carlsson, Stadra, Rockesholm.

Value of output 1907: 22,980 kr. Number of workmen: 35.

The manufacture of roofing slates has been carried on since the end of the 18th cent. The Company manufactures roofing slates, sawn, planed and ground plates for electric purposes, step and pavement stones, hearth-stones, cills, etc., etc.

The rock, consisting of Archean clay slate, is quarried in the northern and eastern quarries.

The works are driven by two petroleum motors, aggregating 35 h. p., a rotary pump and a force-pump are used for raising water and a combined cage and funicular railway are employed for raising the broken rock, a stone-plane and a stone-saw are also engaged.

The roofing slates from these works find a market in Sweden itself and are also exported to Denmark and Finland.

*Handöls Täljstens (pot-stone) och Vattenkraft (water-power) Aktiebolag.* Postal and telegraphic address: »Handöls, Enafors» or »Handöls, Stockholm». Office: Lästmakaregatan N:o 6, Stockholm. The Company was established in 1900. Joint capital: 400,000 kr. in shares of 500 kr. each. Acting manager: Sune Zettervall, civil engineer, Djursholm. Foreman: G. A. Aronson. Value of output 1906: 41,360 kr. Number of workmen: 28.

The manufacture consists of stoves, kitchen-ranges, pots and pans, bricks for sulphate cellulose factories, etc. and building materials.

The Company owns Handöls pot-stone quarry in the parish of Åre, in Jämtlands län, 8 km. from Enafors station on the main line from Stockholm to Storlien.

The Company has obtained awards of prizes for its fabrications at Malmö, Stockholm, Paris and Gäfle; gold medal at Östersund 1905 and at Brussels 1906.

*Hellekis Aktiebolag,* Hellekis. Telegraphic address: Hellekis, Kinnekulle. Manager: Baron C. Klingspor. Steward: A. M. Stenbäck.

The Company owns Gössäter stone-works which were established in 1877 by L. W. Kylberg and bought by the Hellekis Aktiebolag in 1899.

During the years 1857—1899 the stone business was also prosecuted at the harbour of Hellekis, since 1892 on a considerably diminished scale. Joint capital: 1,050,000 kronor. Value of output 1907: 81,500 kronor. Number of workmen: 70.

The Company furnishes all kinds of limestone for building purposes. The raw material is Lower-Silurian *Orthoceras* limestone from Kinnekulle in Västergötland, partly grey, partly red. Six stone-planes are in use for working the limestone.

The products find a market only within Sweden, mainly as facade lining for buildings at Stockholm and Gothenburg.

*Helsingborgs Stenhuggerifabrik*, Helsingborg. Owner: Axel Bernhard Otterström (established 1871). Postal and telegraphic address: Helsingborg.

Value of output 1906: 29,707 kr. Number of workmen: 9.

The factory manufactures slabs for furniture fittings and building stones, tombs, etc.

The works are driven by an electric motor.

*Hillringsbergs aktiebolag*. Owners: Aktiebolaget Glafvas slate- and stone-quarries in the parish of Glafva, Värmlands län. Postal address: Glafva. Telegraphic address: Hillringsberg, Arvika.

Value of production: 5—10,000 kr. a year. Number of workmen: 10—15.

The Company manufactures roofing slates, the so-called Glafva slates.

The Company's products were awarded a large silver medal at the Centenary Exhibition at Karlstad, 1903.

*Fredrik Holmqvist*, Karlskrona. Postal and telegraphic address: Karlskrona. The business was founded in 1898. Value of output 1907 (f. o. b.): 255,000 kr. Number of workmen: 225.

Manufacture of paving and curb stones of red, grey and blue granite and gneiss from the sea-board tracts of Blekinge. The firm owns quarries and stone-works in the parishes of Hjortsberga, Nätraby, Ronneby, Backaryd, Rödeby, Fridlestad, Mörrum and Ölgehult (situated in the Ronneby, Karlskrona and Karlshamn districts); about 50 quarries in 5 principal divisions.

The stone found a market in Sweden, Russia, Denmark, Holland and especially in Germany.

*Hufvudsta Stenbrott och Stenhuggeri* in the parish of Solna in Stockholms län. Postal address: Hufvudsta. Owner: P. O. Ölander.

Value of production 1906: 45,000 kr. Number of workmen: 30.

The firm manufactures curb stones and also building stones, such as granite basements, of Stockholm granite.

*Högö Stenbrott och Stenhuggeri*, in the parish of Loftahammar, Kalmar län. Postal address: Västervik. Manager: E. Nyström.

Owners: E. Nyström as lessee, with Akt. Bol. Gust. Ideström & Co., Västervik, as sleeping partner.

Value of output 1906: 13,666 kr. Number of workmen: 17.

Manufacture of paving stones of the fine-grained granite from Högå in Kalmar län.

*Hörviks Stenhuggeri*. Postal address: Sölvesborg. Telegraphic address: Granite, Sölvesborg. Owner: John Persson, Hosaby.

Value of annual output: about 30,000 kr. Number of workmen: about 15.

The firm manufactures only curb stones for pavements. The business commenced in 1901 with the firm A. K. Fernström as purchaser. From the year 1904 a German firm bought all the stone quarried here.

*Jernavik Stenhuggeri*, parish of Bräkne-Hoby, Blekinge län, near Kullåkra station on the Mellersta Blekinge railway. Owner: N. P. Lennartsson, Lund. Manager: I. P. Hallbäck. Postal address: Kullåkra.

Value of output 1906: 10,500 kr. Number of workmen: 10.

The manufacture comprises curb and building stones, etc.

*Sven Jönsson's Stenbrott, Stenhuggeri och Mekaniska Sliperi*, parishes of Bräkne-Hoby, Hällaryd and Backaryd. Postal address: Bräkne-Hoby. Owner: Sv. Jönsson, Måstad, Bräkne-Hoby.

Value of output 1906: 65,550 kr. Number of workmen: 51.

The firm furnishes paving stones and polished and unpolished sepulchral monuments.

Plant: an electric motor of 3 h. p., and two stone-grinding and polishing works.

*Kessel & Röhl's Granitaktiebolag*, Oskarshamn. The German firm which several years ago worked different of our more important granites, has now practically ceased its business operations in Sweden. At Vånevik, in the vicinity of Oskarshamn, it has, however, a number of granite quarries still in work, operations being confined mainly to the quarrying of rough blocks at that place.

Value of output 1906: 21,200 kr. Number of workmen: 11.

*Klagshamns Stenhuggeri och Sliperi*, parish of Västra Klagstorp, Malmöhus län. Postal address: Klagshamn. Owner: Klagstorps Kalkbrottsaktiebolag.

Value of output 1906: 32,500 kr. Number of workmen: 30.

Manufacture of building stones of cretaceous flint.

*Käpplunda Kalk- och Stenbrott, Stenhuggeri och Sliperi*, Sköfde rural parish. Postal address: Sköfde. Owner: Henning Johansson, merchant, Tegnérsgatan N:o 59, Stockholm.

Value of output (of curb stones) 1906: 11,053 kr. Number of workmen: 31.

Manufacture of curb stones and of lime.

*Landskrona Stenhuggeri och Maskinsliperi*, Landskrona, was established about 30 years ago by E. Holmberg. Owner: E. W. Lindberg. Postal and telegraphic address: Landskrona. Value of annual output: about 22,000 kr.

The stone-works employ polishing machines, vertical grinding machines, grinding and polishing lathes and a sand-blowing machine, driven by a gas-motor of 6 h. p. Manufacture of building stones and sepulchral monuments the rough stone for which is taken from the granite quarries in the north of Scania.

*Lemingstorps Sandstensbrott.* Postal and telegraphic address: N. Freberga, Motala. Owner and manager: Major P. A. H. Stjernspetz. Value of output: 2—5,000 kr. a year. Number of workmen: 3—6.

Since the beginning of 1860 millstones have been made here from the sandstone of the Visingsö series, and during recent years also grind-stones for wood-pulp factories. The sandstone-debris are disposed of to various iron-works in Sweden.

A steam-engine of 3 h. p. is employed for driving a pump and a hoisting crane.

*Långbro Stenbrott, Stenhuggeri och Sliperi,* parish of Vårdinge, Stockholms län. Postal address: Mölnbo. Owner: Carl Wersén, Södertälje. Value of output 1906: 16,400 kr. Number of workmen: 9.

Manufacture of building stones and sepulchral monuments, etc.

A petroleum motor of 14 h. p., two stone-saws and two stone-grinding and polishing machines are employed.

*Majornas Stenhuggeri och Sliperi,* Gothenburg, 1:st Långgatan No 19. Owners: August Rosengren and Pontus Nilsson, Gothenburg.

Value of output 1906: 32,000 kr. Number of workmen: 7.

Manufacture of building stones.

*Karl O. Mattson,* Hunnebostrand, Göteborgs and Bohus län (established 1903). Telegraphic address: Granite, Hunnebostrand. Value of output 1907: about 110,500 kr. Number of workmen: 55.

The firm furnishes rough blocks, paving stones, curb stones, building stones and ornamental stones, all of Bohuslän granite; owns quarries and stone-works in the parish of Tossene at Ammedal, Ulebergshamn and Bögebacka, and in the parish of Askum at Brätteby, Gidderöd and Ödby, all in Bohuslän. At Ammedal and Ulebergshamn is quarried a grey, medium-grained granite, particularly suited for building purposes. The products find a market both in Sweden and abroad (Denmark, Germany, Holland, England and in Cape Colony).

*Carl Müller,* Visby (established 1897). Postal address: Müller, Visby. Value of output 1906: 74,000 kr. Number of workmen: 33.

Manufacture of house building stones, such as front work, cornice work, ornamental doorcases and entrances, copings and sculpture work of light grey Gothland limestone from Visby and Kappelshamn, as well as of Gothland sandstone. The stone has a market chiefly in Sweden itself, but the firm has also had orders from abroad. The works are driven by a steam-engine of 9 h. p.; two stone-planes are employed at the stone-works.

*C. J. Nilsson's Stenhuggeri och Sliperi,* parish of Ventlinge, Öland. Postal address: Ventlinge.

Value of output 1906: 7,414 kr. Number of workmen: 15.

Manufacture of curb stones and building stones of Öland limestone. The works are driven by two wind-wheels and two stone-grinding machines.

*J. E. Nelsson's Stenhuggeri*, Linköping. Owner: J. E. Nelsson. Postal and telegraphic address: Linköping.

Value of output 1906: 39,820 kr. Number of workmen: 27.

Manufacture of marble-work for furniture fittings, sepulchral monuments of granite, the greater part polished, grave-borders, hearthstones and floors of limestone and facade-work of limestone and sandstone, etc.

*C. A. Nilsson's Stenhuggeri*, Karlshamn. Owner: Carl A. Nilsson, Karlshamn.

The firm owns besides stone-works in Karlshamn, also Kulla quarries and stone-works in the parish of Gammalstorp, address: Sandbäck.

Value of output 1906: 20,670 kr. Number of workmen: 12.

Manufacture of building stones, etc.

The works are driven by a water-wheel.

*W. Nilsson, Stenbildhuggeri*, Laholm. The firm was founded in 1892 by the sculptor E. Nilsson. In 1908 the business was transferred to the above firm.

Value of output 1907: 4,000 kr. Number of workmen: 2.

Manufacture principally of sepulchral monuments, on a minor scale of building stone. At Majenfors (Småland) the firm owns occurrences of light green granite.

Market in Sweden.

*Nordöns Skiffergrufvor*, Göteborgs och Bohus län. Postal address: Lycke, Ödsmål. Telegraphic address: Backman. Proprietor and manager: Karl Backman. The business was founded in 1849 by the sergeant-major, J. Welin, and was reorganised in 1888 as Nordöns Skifferbolag, which was dissolved in 1892. In the year 1904 the business passed into the hands of Karl Backman.

Value of output 1907 (f. o. b.): 7,648 kr. Number of workmen: 10.

Manufacture of footpath-stones of all dimensions, garden tables, step-stones and paving slabs.

The slate-quarries are situated in Nordön and in the parishes of Lycke, Solberga and Jörlanda in Göteborgs och Bohus län.

The products find a market in Sweden, Germany and Denmark.

*Norrtälje Förnyade Stenhuggeri Aktiebolag* in the year 1906 took over both the personal and the real property of Norrtälje Mekaniska Stenhuggeriaktiebolag (founded 1888). Joint capital: 60,000 kr. in shares of 500 kr. Board of directors (registered at Stockholm): Director Viktor Kullgren and Hild. Palm, engineer. Manager: Hild. Palm. Telegraphic address: Stenbolaget, Norrtälje. Postal address: Norrtälje.

Value of output 1906: 31,400 kr. Number of workmen: 38.

The firm owns in the parish of Vätö, districts of Bro and Vätö, Uppland, Stockholms län, the following stone-works: Tjärholmen, Söder-

viken, Håknäs and Bergsvik; manufacture chiefly of building stones, monumental and decorative works, building stones for quays and bridges, rough blocks and paving stones. The Company's speciality is the well-known red, so-called Norrtälje granite, but it also possesses large deposits of blue-grey granite.

The Company was awarded a bronze medal at the Industrial Exhibition at Stockholm 1897.

Export to Germany and England.

*Nya Marmorbruksaktiebolaget*, Norrköping. Telegraphic address: Iringborg. Postal address: Norrköping. Board of directors (registered at Norrköping): Edvard and Carl Ringborg, who severally sign for the firm. Joint capital: 150,000 kr. in shares of 250 kr.

Value of output 1907: about 300,000 kr. Number of workmen: 150.

»Nya Marmorbruksaktiebolaget» has from the year 1866 continued to work the serpentine-containing Archean limestone which, under the name of »Kolmård marble», has been quarried for well-nigh 300 years in the quarries at Kolmården on the north shore of Bråviken, about 25 km. from Norrköping and 1.5 km. from Kolmården station on the Stafsjö railway (from Kolmården to Virå). The deposits were first exploited by Louis de Geer, the well-known pioneer of Swedish mining in the reigns of Gustavus II Adolphus and Queen Kristina. From the year 1680, however, the marble-quarries lay unused, until on the 22nd March 1722 King Frederic I granted kanslirådet, Baron Eric Wrangel and Gabriel Gyllengrip, member of the board of trade, privileges to work the quarries. After many vicissitudes the marble-quarries were transferred from Count Carl Johan Gyllenborg in 1802 to the manufacturer John Gustaf Nordstedt, in 1805 to the sculptor C. F. Beurling, in 1812 to the manufacturer John Niclas Eckerman, in 1837 to the manufacturers Gustaf Levin and Eric W. Westerberg, in 1850 to the merchant P. A. Enhörning, in 1857 to Baron Louis Alexander Arthur Rozycki, in 1861 to Kolmårdens Marmorbruks Aktiebolag, in 1866 to Nya Marmorbruksaktiebolaget.

The Company manufactures polished and unpolished building marble, such as floor slabs, wall-linings, pilasters, floor-, window- and wall-cornices, step-stones and all kinds of ornamental work, columns, pedestals, balustrades and every turnery. Since the year 1904 the quarrying and dressing of marble are conducted on modern lines and with an up-to-date plant. The works are driven by a steam-engine of 250 h. p., electricity, and compressed air; the quarry has four framesaws, fifteen grinding, profiling and polishing machines and lathes of every description.

The products find an extensive sale both within Sweden and abroad. Thus export takes place to England, Russia, France, Germany, the United States of America, the Cape Colony, Argentina and India. England with her colonies is the biggest customer for dressed marble. Competition has been taken up, with ever increasing success, with Belgium and Italy, the leading exporting countries of these products. The Company has taken part in exhibitions at Copenhagen 1872, Bogota 1875, Stockholm 1897, Gothenburg 1905, Norrköping 1906, Lund 1907, St. Petersburg 1908 and has everywhere met with favourable recognition for its marble, decorative both in colour and structure and for the way in which it is worked.

*Nya Mekaniska Stensliperiet*, Kristianstad. Owner: W. Rydén. Postal address: Kristianstad.

Value of output 1906: 26,000 kr. Number of workmen: 12.

Manufacture of curb stones, as well as polished and unpolished work.

A gas-machine of 7 h. p., a small stone-saw and stone-grinding and polishing-machines are employed.

*And. Persson, Granitverk* (established 1901). Postal address: Emsfors, Broby, Kristianstads län. Owner: And. Persson.

Value of output 1907: about 15,000 kr. Number of workmen: 15.

The manufacture consists of sepulchral monuments. The firm owns quarries at Bränskulla near Emsfors, where »black granite» is quarried, and employs a stone-grindery, saws, turners, lathes, etc.

The works are driven by turbines.

The products find a market in Sweden and Denmark.

The manufactures have been awarded an honorary diploma at Stockholm 1897 and a silver medal at Lund 1907.

*J. G. Rehn's Stenhuggeri*, parish of Solna, Stockholms län. Postal address: Hufvudsta.

Owner: J. G. Rehn, Sundbyberg.

Value of output 1906: 37,808 kr. Number of workmen: 20.

Manufacture of paving and curb stones, as well as building stone for houses of Stockholm granite.

*Råbäcks Stenbrott, Stenhuggeri och Sliperi*, parish of Medelplana, Skaraborgs län. Owner: Baron Carl Klingspor. Manager: J. F. Ericsson. Postal address: Råbäck.

Value of output 1906: 20,182 kr. Number of workmen: 43.

Manufacture of curb stone, step-stones, building stones, polished tombs, etc. of Silurian limestone.

The works are driven by a steam-engine of 10 h. p., and four stone-planes are used.

*Rötveds Stenbrott*, Gårö, Kristianstads län.

Owner: Nils Åkesson.

Quarrying of »black granite».

Value of output 1906: 12,000 kr. Number of workmen: 12.

*Röseholms Mekaniska Stenhuggeri*, Kumla, Örebro län. Postal and telegraphic address: Röseholm, Kumla. The firm was founded in 1888 by Carl Österberg who still owns it. Value of output 1906: 13,952 kr. Number of workmen: 8.

The manufacture consists mainly of step-stones, hearth-stones and building fronts. Further, rough stone is also sold. The raw material is Orthoceras limestone of a grey-brown shade.

The works are driven by electric power. Three planing machines are employed. Five lifting cranes are in use. Market in Sweden, chiefly the towns.

*Änkefru Hanna Schannong's Stenhuggeri och Sliperi*, Lund.  
Manager: G. Schannong.

Value of output 1906: 22,363 kr. Number of workmen: 9.  
Manufacture of building stones, etc.

*E. Schibsted's Stenbrott, Stenhuggeri och Sliperi*, Norrviken district, Göteborgs and Bohus län. Owner: E. Schibsted, engineer. Postal address: Strömstad.

Value of output 1906: 111,200 kr. Number of workmen: 200.

*Carl J. Schylander's Granitaktiebolag*, Oskarshamn. Telegraphic address: »Schylander's», Oskarshamn. Postal address: Oskarshamn. The business was founded in 1896 by Carl J. Schylander and was reorganised as the above Company in 1899. Joint capital: 230,000 kr. in shares of 1,000 kr. Board of directors: Carl J. Schylander, manager, Vice-Consul Gustaf L. Wijkström and Gustaf Johansson, landed proprietor. Managing director: Carl J. Schylander.

Value of output (f. o. b. Sweden): about 200,000 kr. Number of workmen: 200.

The firm manufactures all kinds of granite work, such as bridges, piers and quays, basements, steps, facades, curb and paving stones, etc., as well as sepulchral monuments in black, red and grey granite.

Large lots of rough cloven blocks of granite No. 8 Uthammar are exported annually under the name of »Bon Accord Red» to Aberdeen. They are sawn, cut, ground and polished, and then sent to different countries. The granite in question is used exclusively for polished monumental work, and is in great demand. Granite No. 5 Flivik is used for the manufacture of paving, curb and building stones, and is also exported to Aberdeen as a raw material. Granite No. 4 Hålvik (Kålsebo stone quarry) is used for paving stones, curb stones and stones for harbours, piers, docks and bridges all of which are exported. Granite No. 6 Vånevik, Näset, is used for paving, curb and building stones; moreover basted blocks of it are exported to Germany.

The Company owns stone-works at Uthammar, Hålvik and Flivik, in the parish of Misterhult, as well as Näset and Öfverby, in the parish of Döderhult, Kalmar län, besides a number of rock deposits which have not yet been worked.

At the stone-works all the usual modern tools are used, as well as steam-cranes and hand-cranes of different lifting powers.

Export to Germany, England, Holland, Austria, Russia, and France.

*Sjötorps Stenbrott, Stenhuggeri och Sliperi*, parish of Almby, Örebro län. Owner: Engelbrektson Hallgren.

Value of output 1906: 8,450 kr. Number of workmen: 5.

The firm quarries and works the Lower Silurian Närke sandstone.

*Skandinaviska Granit Aktiebolaget*, Halmstad. Telegraphic address: Stenbolaget. The firm was founded in 1875 under the firm »Halmstads Stenhuggeriaktiebolag», and was transferred in 1905 to the above Company, when the joint capital was increased to 1,800,000 kr. in shares of 1,000

kr. which have been fully paid up. In 1906 the Company purchased Aktiebolaget Karlshalls stone-works in Blekinge. Board of directors (registered at Halmstad): A. Johansson, Consul Th. Schéle, O. Petersen, director, K. Petersen and F. W. Manuelle. Managing director: O. Petersen. Value of output 1906: 1,264,337 kr. Number of workmen: 1,091.

The business comprises three branches:

- a) manufacture of paving and curb stones.
- b) » » building stones.
- c) » » block stones.

To the group a) belong the stone quarries in *Bohuslän*: Hjalmedal, Rixö, Smögen and Fjällbacka; in *Halland*: Söndrum, Gullbrandstorp, Skallen, Stensjö, Tiarp and Ågarp; in *Blekinge*: Guö, Matvik, Gunön, Karlshäll, Sternö, Sandvik, Hästaryd, Mörrum, Torarp, Svengsta, Regneboda and Vekerum.

To the group b) belong the stone-works in *Bohuslän*: Hunnebostrand and Bovallstrand; in *Halland*: Söndrum; in *Blekinge*: Matvik and Guö.

To the group c) belong the stone-works at Oppmanna and Ekeröd, both in *Scania*.

The Company furnishes front and quaystones and all kinds of work, falling under the description of building stone.

The works are driven by steam-engine of 100 h. p. which is also driving an electric motor for transmission of power to six secondary electric motors, further four boilers, etc. and twelve machines for manufacturing machine-cut small sett paving stones («Kleinpflaster»), the Company having acquired the sole rights to use these patented machines in Scandinavia.

The Company devotes itself mainly to export to Germany, Denmark, England, France, Belgium, Holland, Austria-Hungary, Switzerland and Russia. However, by no means inconsiderable quantities of both paving and building stones are placed on the Swedish market.

*Skånska Marmoraktiebolaget*. Postal and telegraphic address: Marmorbolaget, Landskrona. Joint capital: 35,000 kr. in shares of 500 kr. The business was founded in 1897. Managing director: Lorens Helmers.

Value of output: 100,000 kr. annually. Number of workmen: 15—20.

Special factory for the working of all kinds of marble (foreign marble as well as Swedish) for steps, floors of buildings, and particularly well polished furniture marble. The factory employs a stone-saw, stone-plane and six grinding and polishing machines which are driven by a gas-motor of 18 h. p. The products have been awarded several prizes, amongst others the highest prize within the branch at the Industrial Exhibition at Hälsingborg 1903, a silver medal at Lund, etc.

*Skånes Mekaniska Stenhuggeri*. Owner: Åke P. Lidner. Stone-works at Trelleborg. Postal and telegraphic address: Trelleborg. Branches at Malmö, Ystad, and Sibbhult.

Value of output 1906: 48,000 kr. Number of workmen: 40.

Manufacture of curb and building stones.

The works are driven by steam-power (a suction gas-engine with a gas-motor of 25 h. p.) and a stone-saw.

*Skärälids Stenförädlings Aktiebolag.* Manager: A. Andersson.  
Postal address: Skärälid.

Value of output 1906: 70,000 kr. Number of workmen: 53.

Stone-works in the parish of Riseberga, district of N. and S. Åsbo, Kristianstads län, at Skärälid station on the Klippan and Eslöf railway.

Manufacture of coarse building stones and paving stones.

The works are driven by a locomobile.

*Sköfde Mekaniska Stenhuggeri*, parish of Våmb, Sköfde district, Skaraborgs län, near the town of Sköfde (with a station on the Western Main Line and on the Sköfde and Axvall and Sköfde and Karlsborgs railways). Owner: Lieutenant-Colonel Sven Ahlberg. Postal and telegraphic address: Sköfde. Value of output 1906: about 26,000 kr. Number of workmen: 26.

The firm furnishes hewn and planed stone-work of Orthoceras limestone from Västergötland, especially building frontstone of different kinds and other building stone, and also sells rough limestone.

The works are driven by water-power, and five stone-planes are used.

*Smögens Granitaktiebolag*, Grafvarne, parish of Kungshamn, Göteborgs och Bohus län. Postal address: Grafvarne. The Company owns Smögen stone-works in the parishes of Askum and Brastad, where paving stone is manufactured. Manager: N. Berglund. Value of output 1906: 141,500 kr. Number of workmen: 118.

*Edvard Steiner's Stenhuggeri & Sliperi*, Kristinehamn. Owner: Edvard Steiner, Kristinehamn.

Value of output 1906: 13,200 kr. Number of workmen: 7.

Manufacture of polished and unpolished sepulchral monuments, chiefly of the hyperites and diabases which are found in the vicinity of the town. A stone-grinding and polishing machine is used.

*Stenhamra Stenbrott och Stenhuggeri*, parish of Sånge, Svartsjö district, Stockholms län, near Svartsjö steam-boat station, 6 km. from the railway station of Riddersvik on the Stockholm—Västerås—Bergslagen railway. Owner: Town of Stockholm. Manager: Bruno Olsson. Postal address: Svartsjö.

Value of output 1906: 147,140 kr. Number of workmen: 106.

Paving and curb stones, etc. of Stockholm granite are manufactured at these works to meet the requirements of the town of Stockholm.

*Stenhuggeriet vid Svartsjö tvångsarbetsanstalt*, Stockholms län. Director: G. Reuteröron. Value of output: 30,000 kr. Number of workmen: about 140.

Manufacture since 1891 of paving stones and macadam of Stockholm granite. The quarries lie in the parish of Sånge, north of the convict prison. The works employ a 16 h. p. locomobile and a stone-crusher for the manufacture of macadam.

The products are taken by the town of Stockholm.

*Stilleryds Granithuggerier, A. Kappes.* Postal and telegraphic address: Karlshamn. The firm was founded in 1898. Owner: A. Kappes. Value of output 1907: 210,000 kr. Number of workmen: 300.

Manufacture of paving stones. The firm owns the following stone-works in Blekinge län: Stilleryd, Torarp and Svängesta in the parish of Asarum; Klafven, Vekerum, Mörrum, Mellanbäck, Ruan, Gustafstorp and Björkenäs in the parish of Mörrum; Skönevik, Guttamåla, Saxemara and Dragsnäs in the parish of Ronneby; and finally Kuggeboda and Styrsviksholm in the parish of Listerby.

*Svenska Granitindustriaktiebolaget*, Stockholm. Telegraphic address: Granitindustri. Managing director: H. Jæger. The firm was founded in 1883 by the engineer Hugo Gerlach at Varberg, and was taken over in 1896 by a Company with the above name. Joint capital: 1,409,000 kr. in shares of 1,000 kr. Value of production 1907: about 1,500,000 kr. Number of workmen: about 600.

The Company manufactures chiefly rough blocks for export, but also furnishes building stone for facades, bridges and piers, etc., as well as monuments of polished granite in which machine-saws and grinding machines are used.

The firm owns quarries and stone-works at the following places in Sweden: at Varberg (green granite), Hjortsjö, Gyllsboda, Hajstad, Myren, Brännarebygd, Målaskog (black granite), Saltvik, Sternö, Karlshamn (blue-black granite) and Vånevik (red granite).

The works are driven by steam-power, and all the quarries have steam-cranes.

The products find a market chiefly abroad: Germany, Austria, Russia, Switzerland, France and England, only to a slight extent within Sweden.

The Company was awarded a gold medal at the Industrial Exhibition at Stockholm 1897 and at the International Exhibition at Paris in 1900.

*Svenska Granitindustri och Skeppsrederi Aktiebolaget F. H. Wolff*, Karlskrona. The majority of shares were bought up by the firm A. K. Fernström, Karlshamn, who took over the management of the Company, owing to which the head-office of Aktiebolaget Wolff is now at Karlshamn jointly with A. K. Fernström's. Joint capital: 1,750,000 in shares of 1,000 kr. Value of output: about 1,200,000 kr. per annum. Number of workmen: about 900.

Manufacture of paving, curb and building stones.

The business which was founded in 1853 by Consul F. H. Wolff, owns stone-works in 21 parishes in Blekinge län and 5 in Göteborgs och Bohus län. Most of the quarries are situated quite near the Baltic.

The stone-works employ lifting cranes which are partly driven by steam-power.

The firm owns four cargo-vessels for transporting stone.

The products are exported chiefly to north and central Europe.

The firm has been awarded gold and silver medals at Exhibitions both in Sweden and abroad.

*Svensk-Tyska Granitaktiebolaget*, Lysekil. Telegraphic address. Svenskgranit. Managing director: Vice-consul J. G. Gunnerßson. The firm was formed in 1905 by taking over the firm V. E. Molléns Stenhuggerier in Bohuslän, founded in 1882. These stone-works, however, had previously been driven for several years by private persons, Consul V. E. Mollén and others. The Company's stone-works are thus some of the oldest granite stone-works in Sweden. Joint capital: 220,000 kr. (maximum 600,000 kr.) in shares of 1,000 kr. Value of output 1907: 300,000 kr. Number of workmen: about 250.

The manufacture comprises mainly dressed paving stone of all existing qualities, but also curb stone, building stone, quay and dock stone, as well as rough blocks.

The Company owns numerous quarries near the town of Lysekil, in the parishes of Lyse, Brastad, Askum and Tossene, district of Sunnerviken, and in the parishes of Bottna, Svenneby and Kville (Fjällbacka), district of Norrviken, Göteborgs och Bohus län. Of the stone-works the most important at present are the following: Valbodalen, Stensjö, Klefva, Sandvik, Skallhamn, Örn, Fjällbacka, Bottna, Vardås and Ulebergshamn. The rough material is Bohuslän granite of grey and red-grey colour, sometimes medium-grained, but as a rule small- to fine-grained.

The works are driven by steam-power which also drives the cranes.

The Company's products find a steady market in Germany, Denmark, England, Russia and France.

*Joh. Svensson*, Lilltjära, parish of Hanebo, Gäfleborgs län. Postal address: Kilafors. The firm has been quarrying for several years red, fine-grained gneiss-granite (the so-called Kilafors granite used in the ornamental work of the Parliament House) at a quarry, situated between Kilafors and Holmsveden stations in Hälsingland, 3 1/2 Swedish miles from Söderhamn, and supplies both rough blocks and dressed stone. Value of output 1906: 16,000 kr. Number of workmen: average 15.

*S. A. Svensson's Stenbrott*, parish of Lugnås, Skaraborgs län. Postal address: Lugnås. Owner: S. A. Svensson, Lugnås.

Manufacture of millstones of Lugnås decomposed gneiss.

Value of output 1906: 18,000 kr. Number of workmen: 30.

*Tornby Mekaniska Stenhuggeri*, parish of Fornåsa, Östergötlands län. Postal address: Fornåsa. Owner: P. D. Karlsson.

The quarrying of Orthoceras limestone was commenced in 1887 and conducted, on a minor scale, up to the spring of 1907, when the business was extended, so that all kinds of limestone-works are now executed. Gross receipts during the last five months of the year 1907: 8,000 kr. Number of workmen: 12.

The works are driven by a suction gas-engine of 12 h. p., and stone-planes and other machines are used for working the limestone.

*Uddebergs Stenbrott och Stenhuggeri*, parish of Vätö, Stockholms län. Postal address: Vätö. Owners: J. G. and K. M. Pettersson (firm: Pettersson & Co.).

Value of output 1906: 12,000 kr. Number of workmen: 10.  
Manufacture of paving stones.

*Uddevalla Mekaniska Stenhuggeri och Sliperi, Hebbel & Co.*

Postal and telegraphic address: Hebbels, Uddevalla. The firm which is owned by the engineer Emil Hebbel, Consul John A. Peterson and Axel E. Peterson, merchant, was established in 1904, and acquired the granite quarries and stone-works at Lysekil which had previously been owned by Kessel & Röhl's granitaktiebolag. Value of output 1907: about 150,000 kr. Number of workmen: about 75.

The firm furnishes both rough blocks and finished work. Speciality: front granite and sepulchral monuments. Granite quarrying is carried on at stone-works at Lysekil, at Stånehufvud (granite No. 7 or Lysekil and Stånehufvud granite), at Rabbalshede, on the Uddevalla—Strömstad railway (granites No. 3 and No. 6), and at Alviken near Gräbbestad.

In the town of Uddevalla the firm owns a stone-grindery with five round grinding-machines, a lathe, a saw, a vertical drilling-machine for pillars, a sand-blower with compressed air motors. The grindery is driven by a 35 h. p. petroleum motor.

Sepulchral monuments are placed in Sweden and Denmark, front granite goes chiefly to Swedish markets, and finds its way to foreign countries (Germany and England) only to a small extent.

*Otto Undén.* Postal address: Gössäter. Telegraphic address: Undén, Kinnekulle. The business was founded in 1900.

Value of output 1907: 32,000 kr. Number of workmen: average 28.

Manufacture of dressed, planed and polished work in red and grey Orthoceras limestone at two mechanical stone-works, one at Gössäter on the mount Kinnekulle, the other at Ulunda, in the parish of Varnhem, Skaraborgs län. The works are driven by a petroleum motor, and stone-planes are used, etc.

The products have hitherto been confined to the Swedish market.

The products have been awarded a gold medal at the Industrial Exhibition of Skara in 1905.

*Vestanå Kalkbruk och Mekaniska Stenhuggeri.* Postal address: Borensberg, Östergötlands län. The business was founded in 1901 by the present owner, Dr. P. F. Landelius.

Value of output 1907: 22,500 kr. Number of workmen: 16.

Manufacture of all kinds of building stone (such as front-stone, steps, flag-stones, etc.; the rough material consists of Orthoceras limestone), as well as lime, slate powder and limestonedust.

At the stone-works there are two limestone-planes and a stone-lathe with the requisite number of cranes and pumps all of which are driven by electricity (three electric motors).

The stone-works and lime-works are situated near Borensberg locks on the Göta Canal, and close to Borensberg railway station.

The market has hitherto been confined to Sweden.

*Visby Kooperativa Stenhuggeriförening.* Manager: Albert Hammarberg.

Value of output 1908: about 16,000 kr. Number of workmen: 8.  
Manufacture of all kinds of front-work of Gothland limestone.

*W. Werner's Stenhuggeri*, Krokstrand, parish of Skee, Norrviken district, Göteborgs och Bohus län, close to the municipal community of Björneröd (steamboat communication with Strömstad, etc.). Owner: W. Werners Aktieselskab at Kristiania. Manager: Ludvig Hansson. Postal address: Krokstrand, Björneröd.

Value of output 1906: 110,400 kr. Number of workmen: 104.  
The firm manufactures paving stones of Bohuslän granite.

*Wester & Norgren's Mekaniska Stenhuggeri*, Torkel Knutssongatan No. 31, Stockholm. Owners: A. W. Wester and J. Norgren. Postal and telegraphic address: Wester & Norgren, Stockholm.

Value of output: about 170,000 kr. Number of workmen: about 50.  
Manufacture of marble and limestone works, chiefly of green marble from the firm's own quarries.

The works are driven by a steam-engine of 12 h. p. The firm has been awarded gold medals for its fabrications at the Industrial Exhibitions at Stockholm 1897 and at Gefle 1901.

*Djürke Viëtor*, Karlshamn, owns stone quarries in the parish of Asarum, W. district, Blekinge län. Telegraphic address: Viëtor, Karlshamn. Postal address: Karlshamn.

Value of output 1906: 28,384 kr. Number of workmen: 33.

*Vrå Marmorbrott*, parish of Hölö, Södermanlands län. Owner: Knut Jansson. Postal address: Hölö.

Value of output 1906: 6,000 kr. Number of workmen: about 6.  
Quarrying of marble and sale of rough blocks.

*Våneviks Granit Aktiebolag* (founded 1903), owner of the Vånevik Quarry and Stone-works, parish of Döderhult, N. Møre and other districts, Kalmar län, near the country-town of Påskallavik. Joint capital: 150,000 kr. in shares of 1,000 kr. Board of directors: J. Bogenhardt and H. W. Grauers. Managing director: J. Bogenhardt. Telegraphic address: Stenzel, Oskarshamn. Postal address: Påskallavik.

Value of output 1906: 138,000 kr. Number of workmen: 210.  
Manufacture of paving and curb stones and rough blocks.

The works have four steam cranes, totaling 54 h. p., and a steam-engine of 18 h. p.

*Vändvikens Stenhuggeri*, parish of Vätö, Mellersta Roslags district, Stockholms län, close to Vätö steam-boat station. Owner: the firm Bäckström and Haglund. Postal address: Vätö.

Value of output 1906: about 48,000 kr. Number of workmen: 24.

Manufacture of paving and curb stones, as well as building stones and sepulchral monuments of Norrtälje and Vätö granite.

*Västerviks Granitindustri, J. Schannong* (firm founded 1884). Postal address: Västervik. Telegraphic address: Schannong, Västervik. Owner: J. Schannong, Copenhagen. Value of output 1906: 90,000 kr. Number of workmen: 32.

Manufacture of sepulchral monuments.

The stone-works are situated at Västervik (on an arm of the Baltic, and with a station on the Norsholm—Västervik—Hultsfred railway). Four stone-saws and 10 stone-grinding and polishing machines are used for the working. The works are driven by one steam-engine of 12 and one of 25 h. p.

*Yxhults Stenhuggeri Aktiebolag*. Head office: Yxhult. Postal and telegraphic address: Kumla. Office at Stockholm: 69 Västmannagatan. The Company was founded in 1879. Joint capital: 499,500 kr. in shares of 500 kr. Managing director: Carl Fredberg, Stockholm. Manager: Emil Adlers, engineer.

Value of output: about 485,000 kr. Number of workmen: about 310.

The Company owns Yxhults stone-works and lime-works and Hällebråten's limestone quarries in the parish of Kumla, Örebro län, 7 km. from Kumla station on the State railway from Örebro to Hallsberg, Vilhelmsbergs stone-works in the parish of Asker, Örebro län, 10 km. from Kilsmo station on the Western Main Line, and finally Lanna stone-works, in the parish of Hidinge, Örebro län, 3 km. from Vintrosa station on the Örebro and Svartå line.

The greater part of the limestone quarries at Yxhult and Hällebråten are situated on what used to be known as the Hällebråten crown lands which in 1824 were purchased from the Crown by Conrad Adlers, regimantal commissioner, and others, and shortly after became the sole property of Conrad Adlers, who added to it, from time to time, by purchasing some of the surrounding homesteads. In 1852 the property passed into the hands of Gustaf Adlers, and in 1868 of hofrättsrådet W. Adlers, who transferred the property to the above Company. Stone-cutting has been carried on there from very ancient times. Several ancient buildings, such as the old Churches of Örebro and Kumla, still testify to the durability of the stone and to high degree of craftsmanship which prevailed as far back as the 14th century. The Company manufactures building stones, sepulchral monuments, millstones and marble work, as well as lime.

At Yxhult the following machines are in use: seven stone-planes, two lathes, one straw-plaiting machine, four overhead traveller, eight hoisting cranes, three pumping-engines, five elevators, a figuring lathe, a boring-machine and a machine-saw, all driven by twelve electric motors, aggregating 70 h. p. At Vilhelmsberg there are: seven stone-planes, three elevators, six hoisting cranes, four pumps and one figuring lathe; the motive power is a steam-engine of 70 h. p. which drives eight electric motors. At Lanna there are: five stone-planes, six hoisting cranes, one traveller, one pump, one figuring lathe and one elevator; the driving agent is water-power of 35 h. p. which drives six electric motors.

The products find a market in Sweden and are exported to Finland and Denmark.

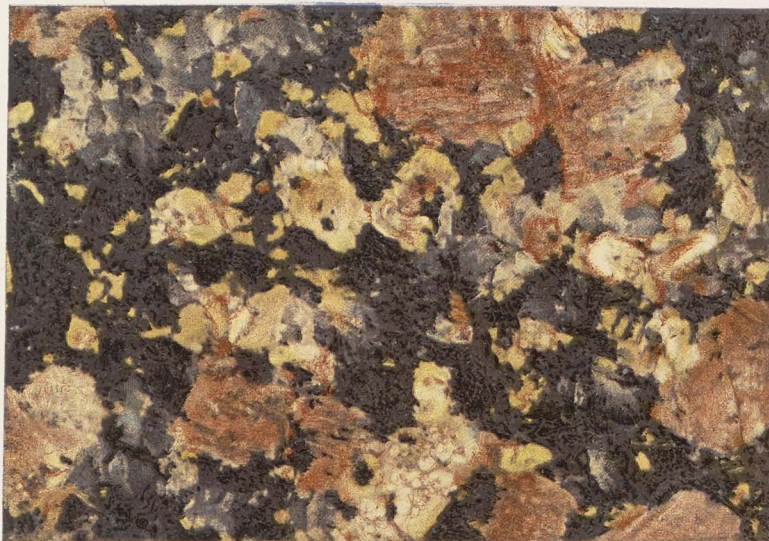
Prizes have been awarded to the Company's products at the Industrial Exhibitions at Stockholm 1897 and at Örebro 1900.

*Östkinds Stenhuggeri*, Kneippbaden, parish of Borg, Östergötlands län. The business was founded in 1898. Owners: Adolf Berglund, manager, Kneippbaden, Captain O. F. Kugelberg, Norrköping, and the foreman August Nilsson, Kättinge. Value of output 1907: 31,295 kr. Number of workmen: 17.

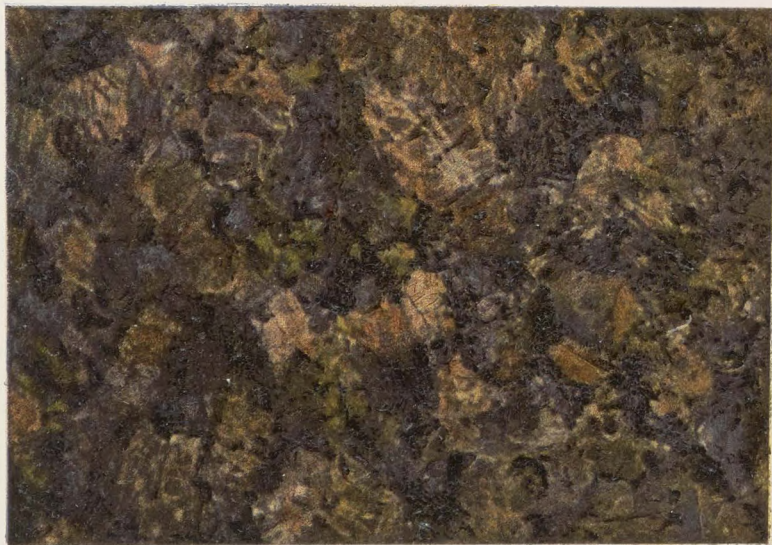
The manufacture consists mainly of paving stones. The quarries are situated at Broxvik estate close by Bråviken, near Kättinge station on the line from Norrköping to Arkösund. The products go to Norrköping and other Swedish towns, but the greater part are sent to Berlin.

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Pl. 1.



1. GRANITE. Grafversfors, Östergötland.



2. GRANITE. Grafversfors, Östergötland.



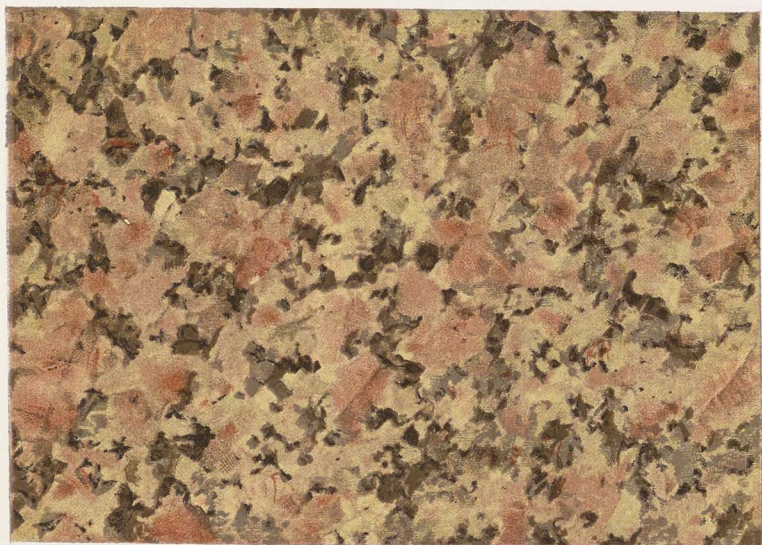


1 GRANITE Vänevik, Småland. («Vänevik-Granite».)



2. GRANITE. Grafversfors, Östergötland.





1. GRANITE. Svenneby, Bohuslän.



2 GRANITE-PORPHYRY. Elfdalen, Dalarne.



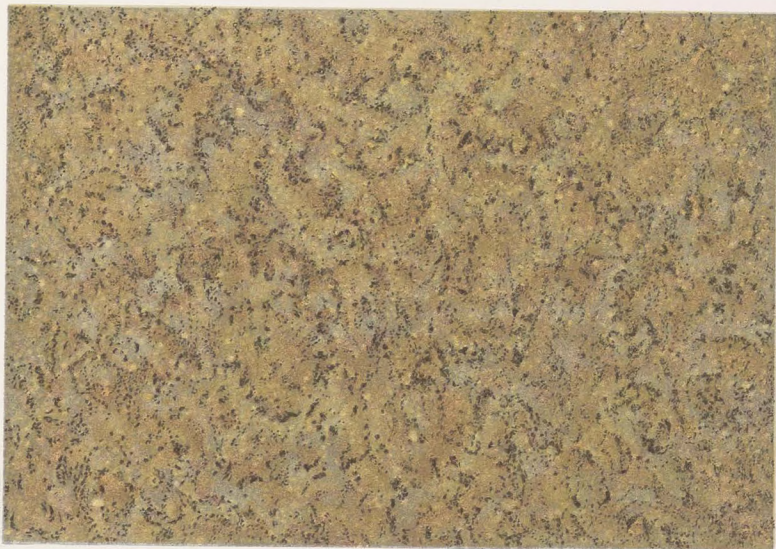


1. GRANITE. Örnsköldsvik, Ångermanland.



2. GRANITE. Rabbalshede, Bohuslän.

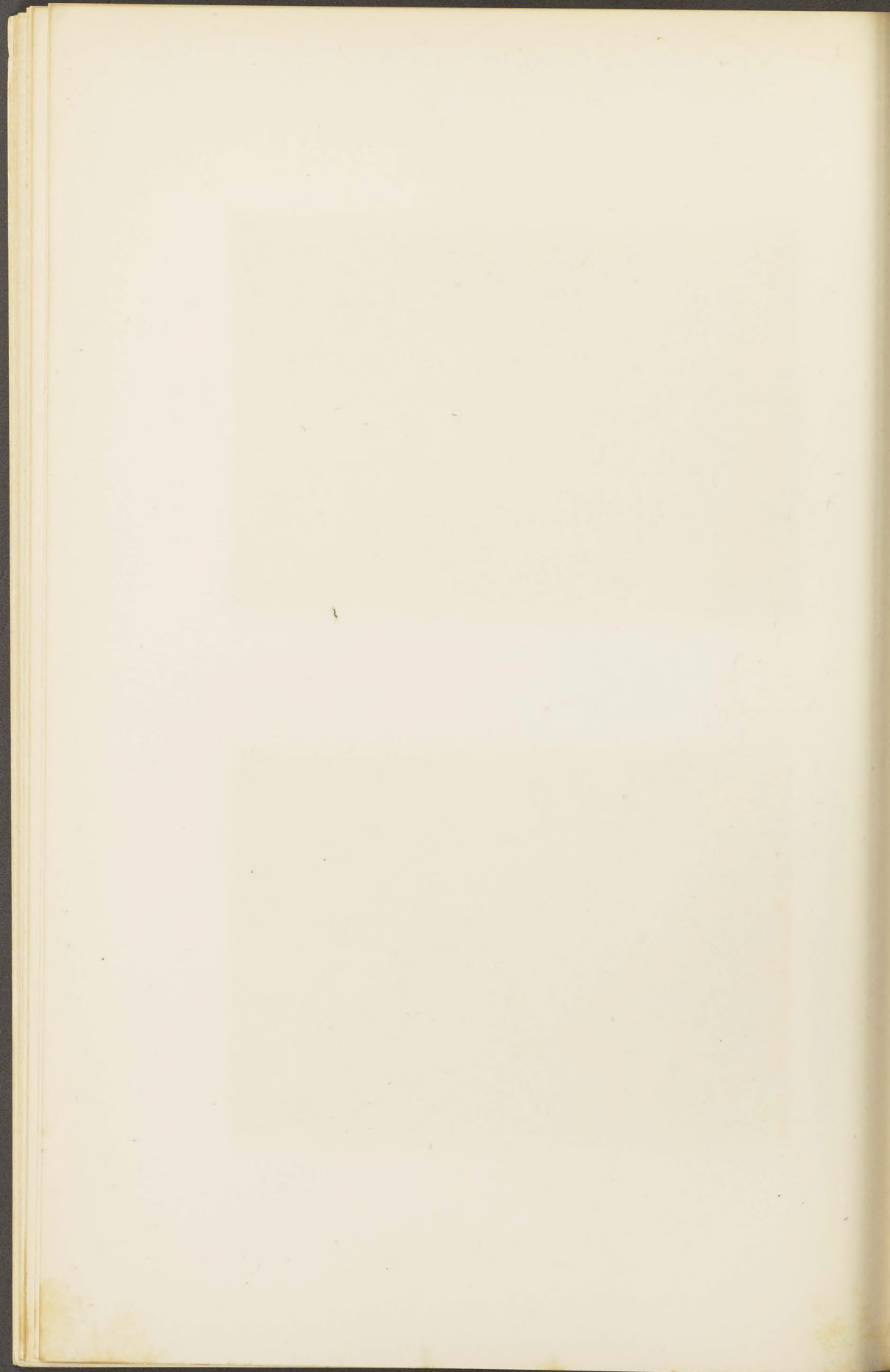




1. GRANITE. Malmö, Bohuslän.

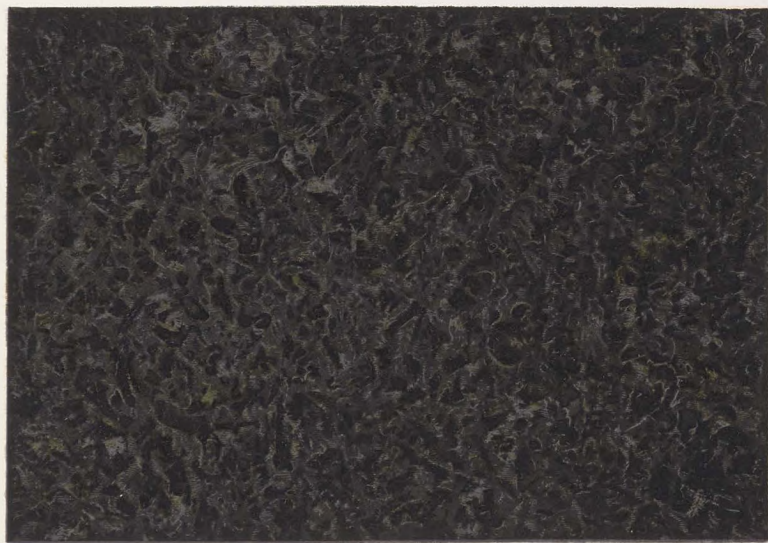


2. DARKGREEN GNEISS. Varberg, Halland.  
(»Varberg-Granite».)

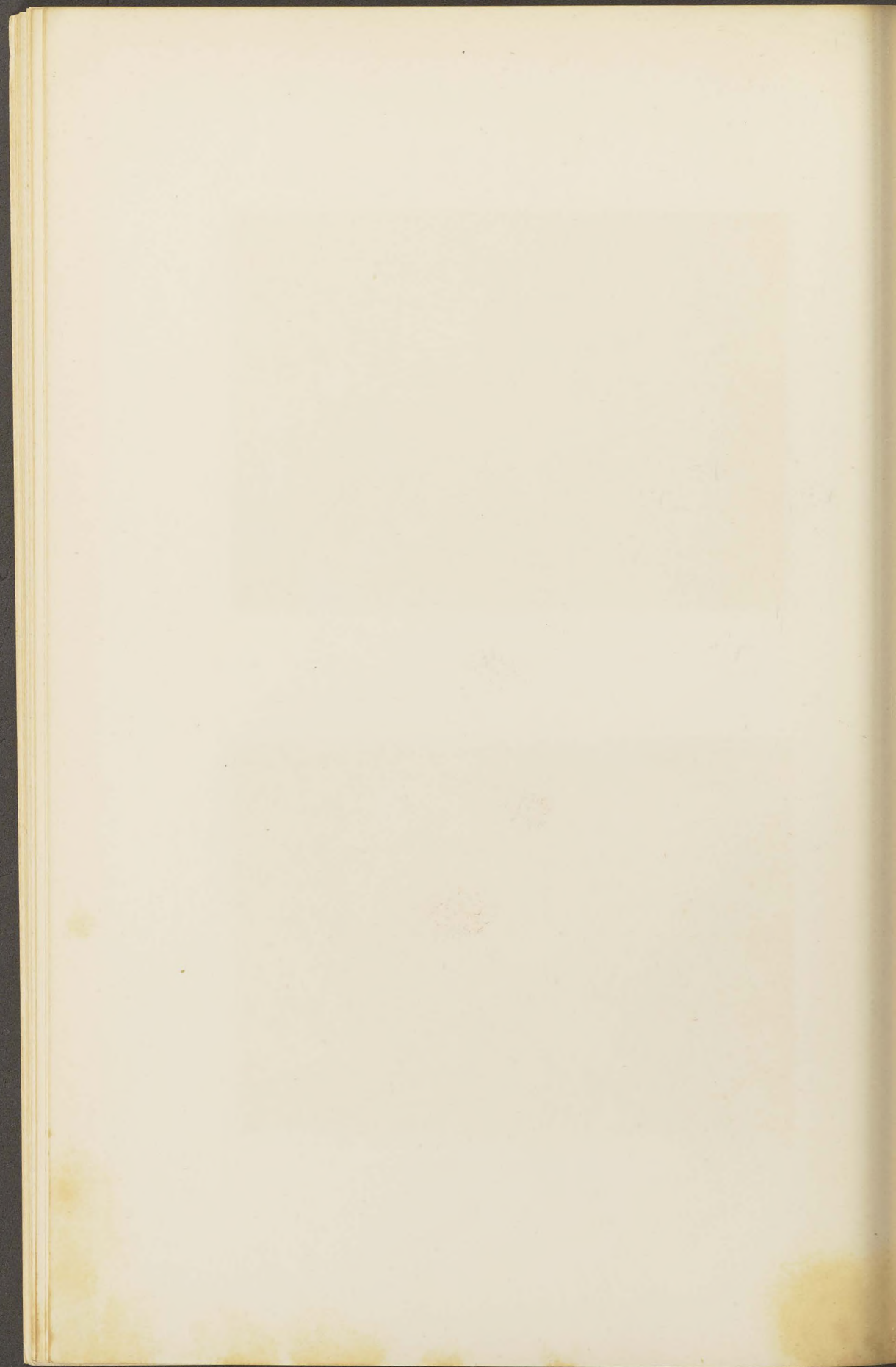


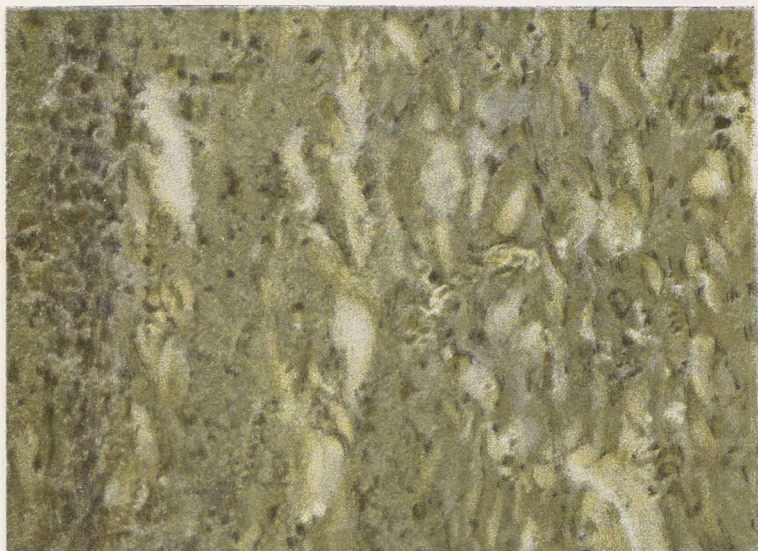


1. DIABASE. Karlshamn, Blekinge.



2. DIABASE. Rydaholm, Småland. («Black granite».)

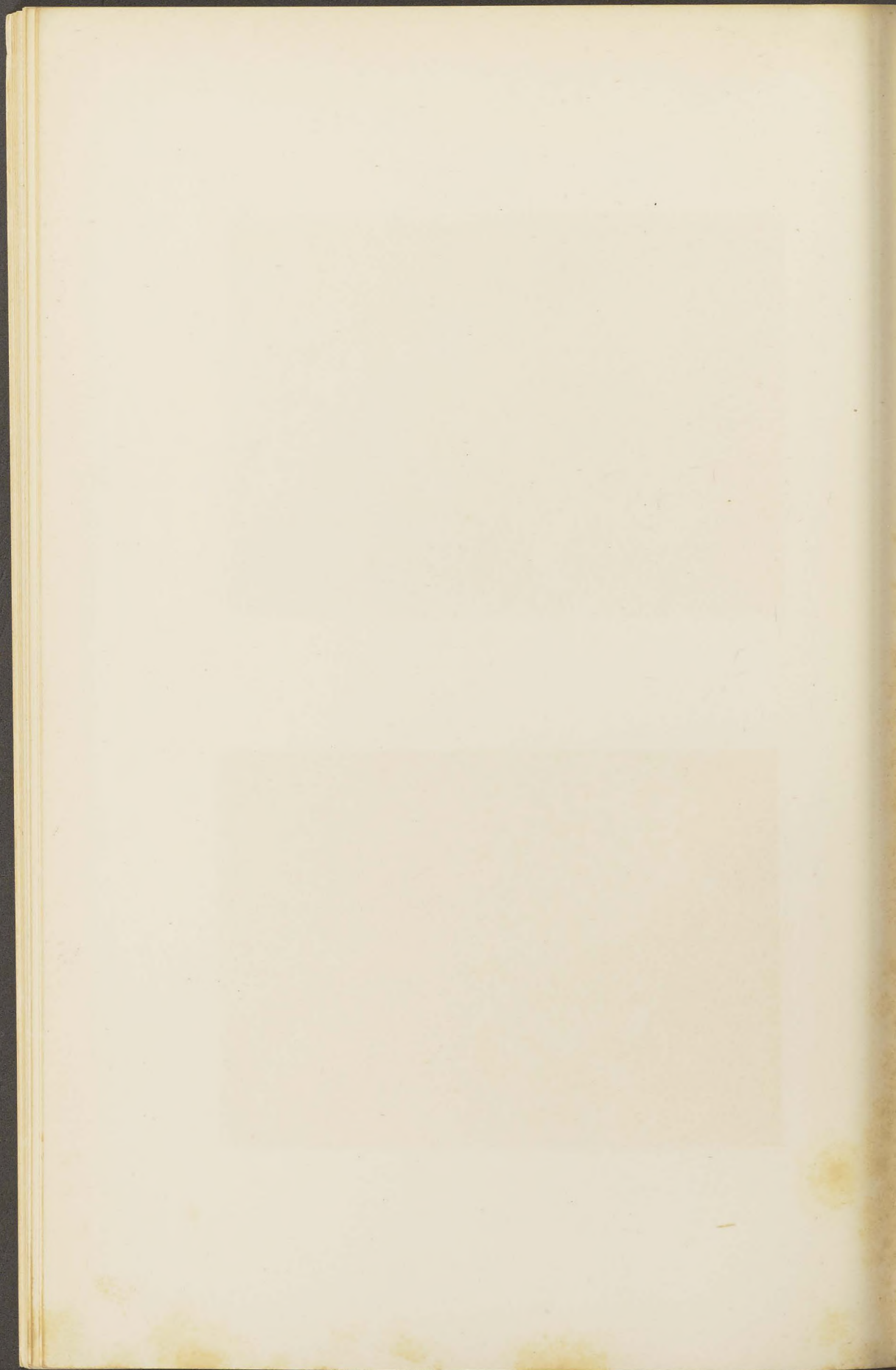




1. MARBLE. Marmorbruket, Kolmården, Östergötland.

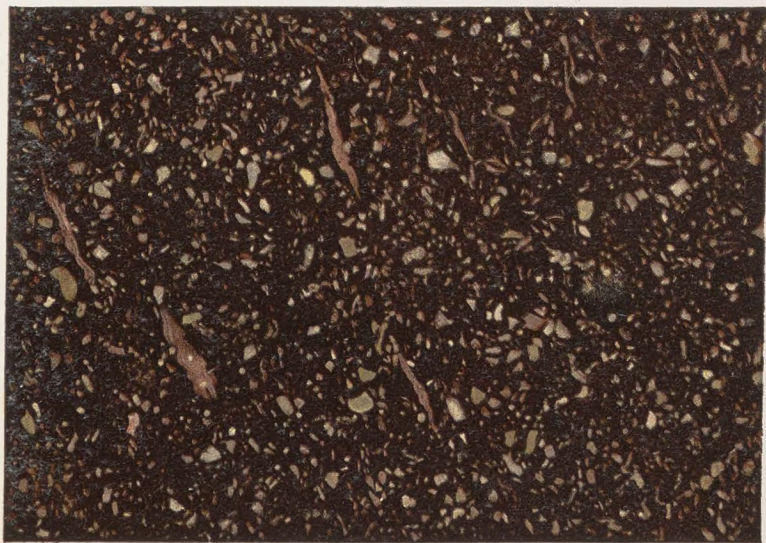


2. DIABASE. Galtströms Bruk, Medelpad.

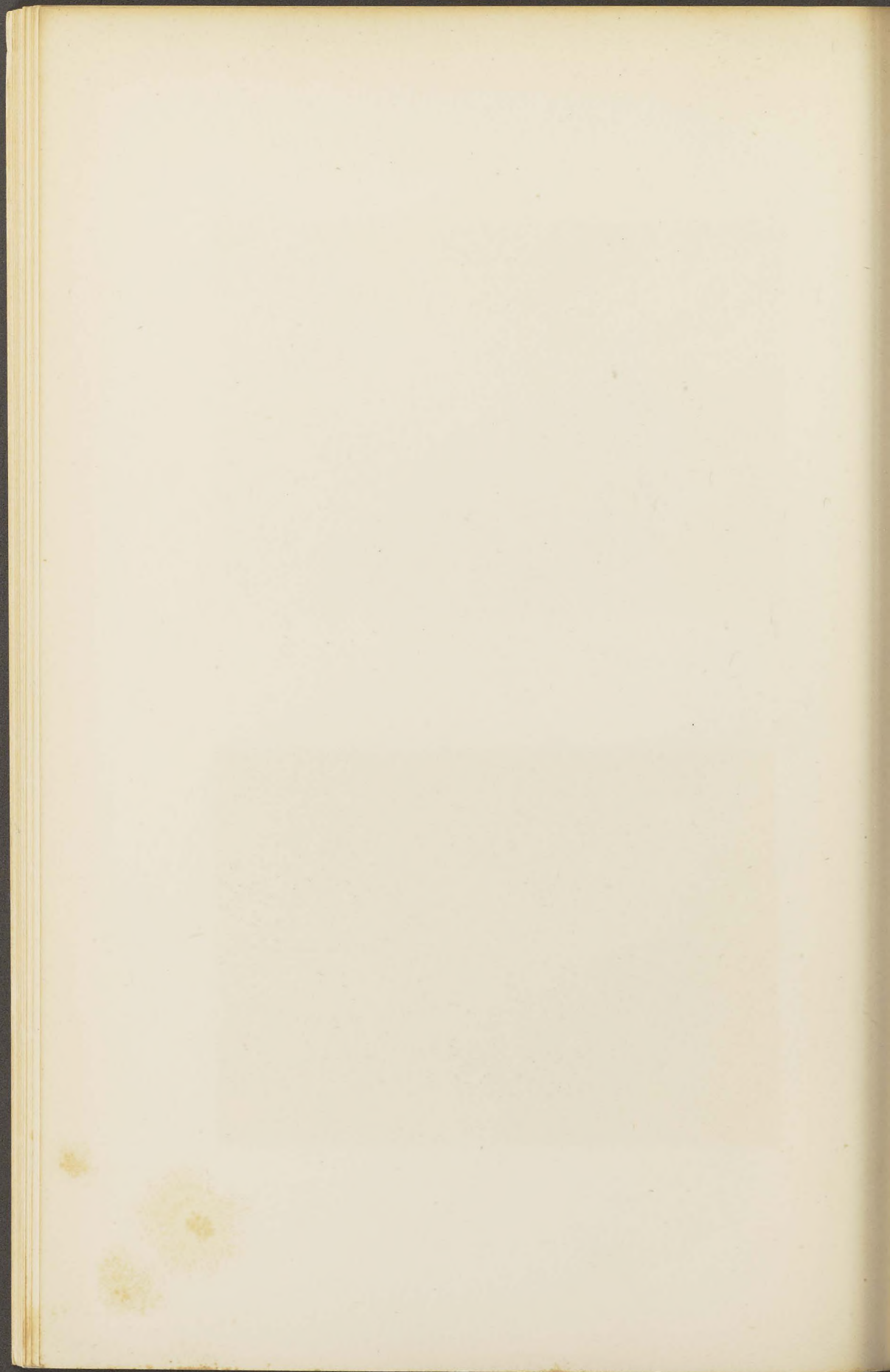


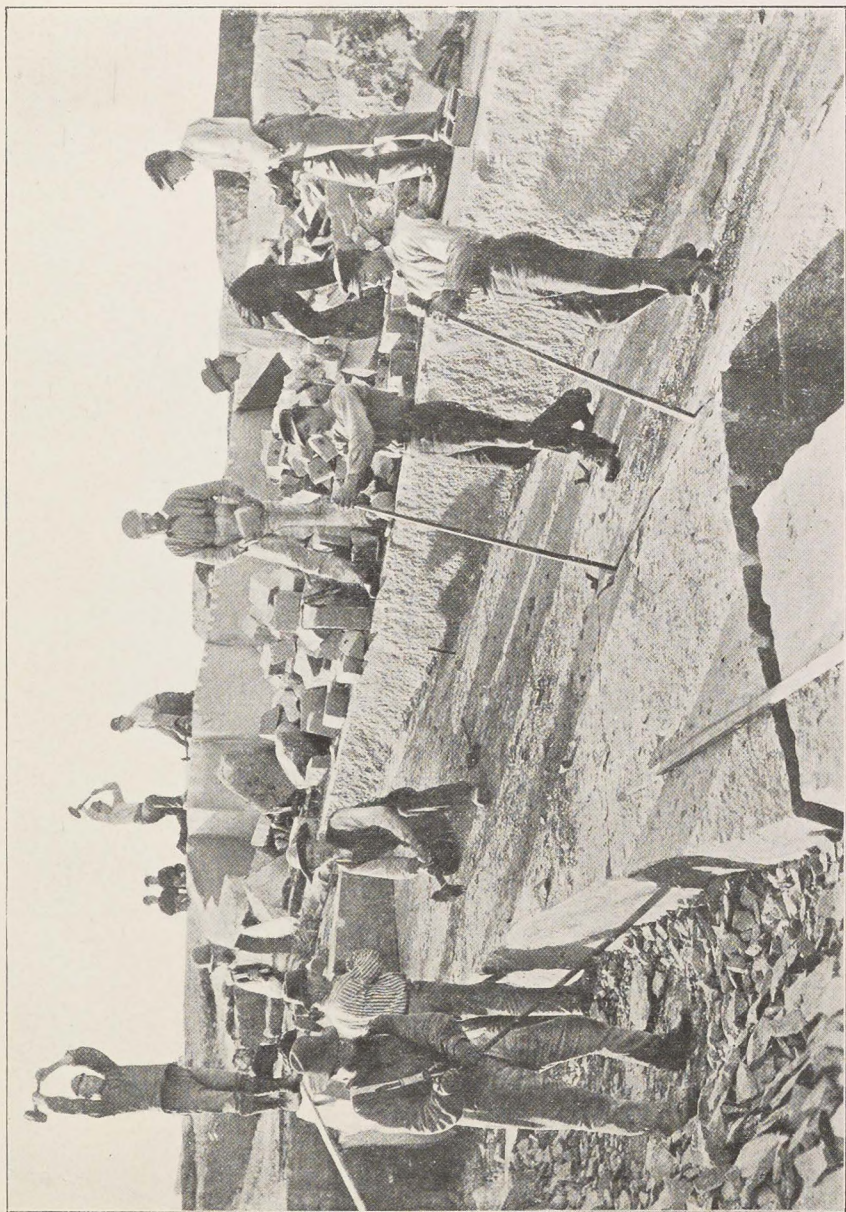


1. SANDSTONE. Övedskloster, Skåne

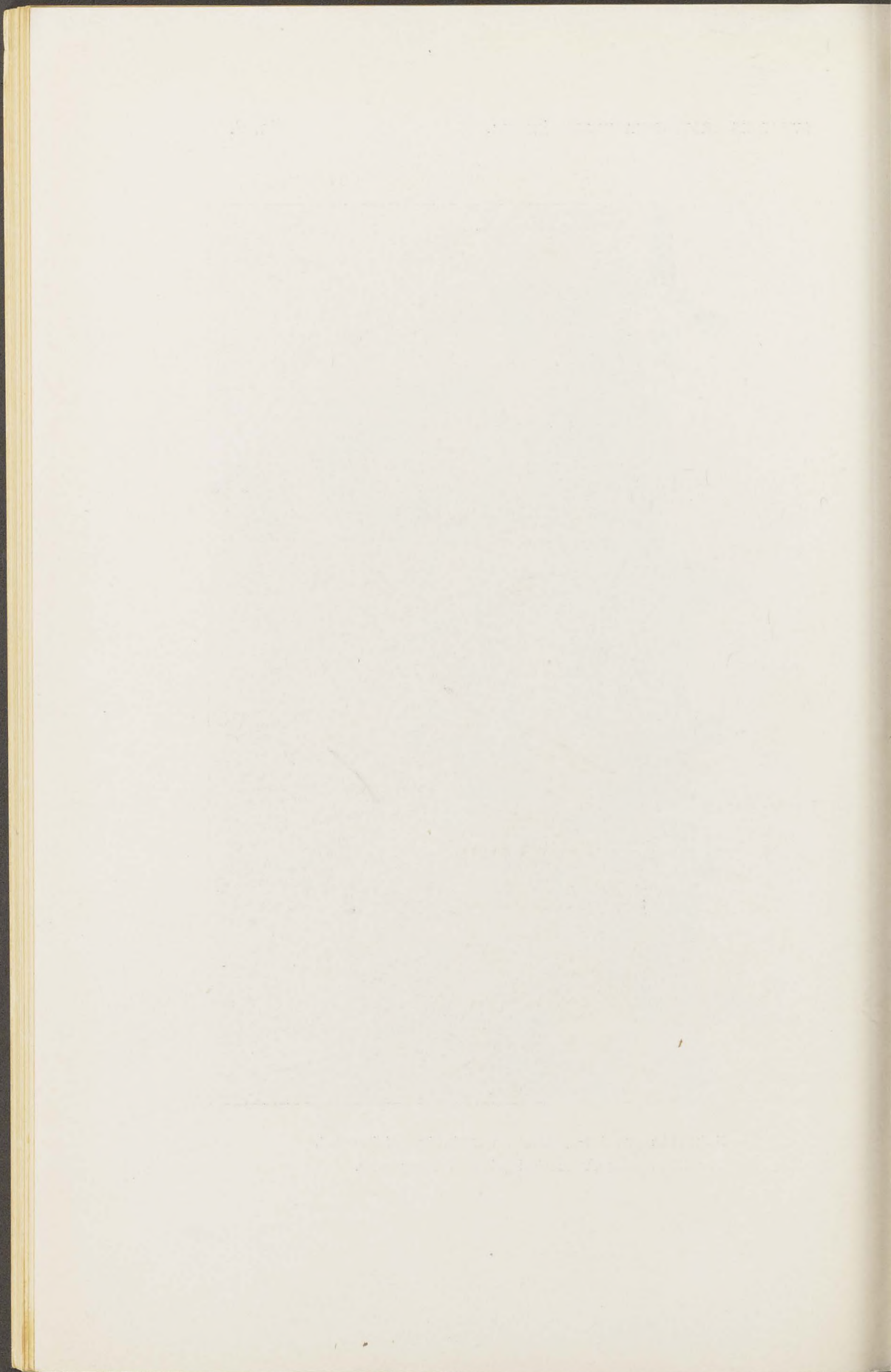


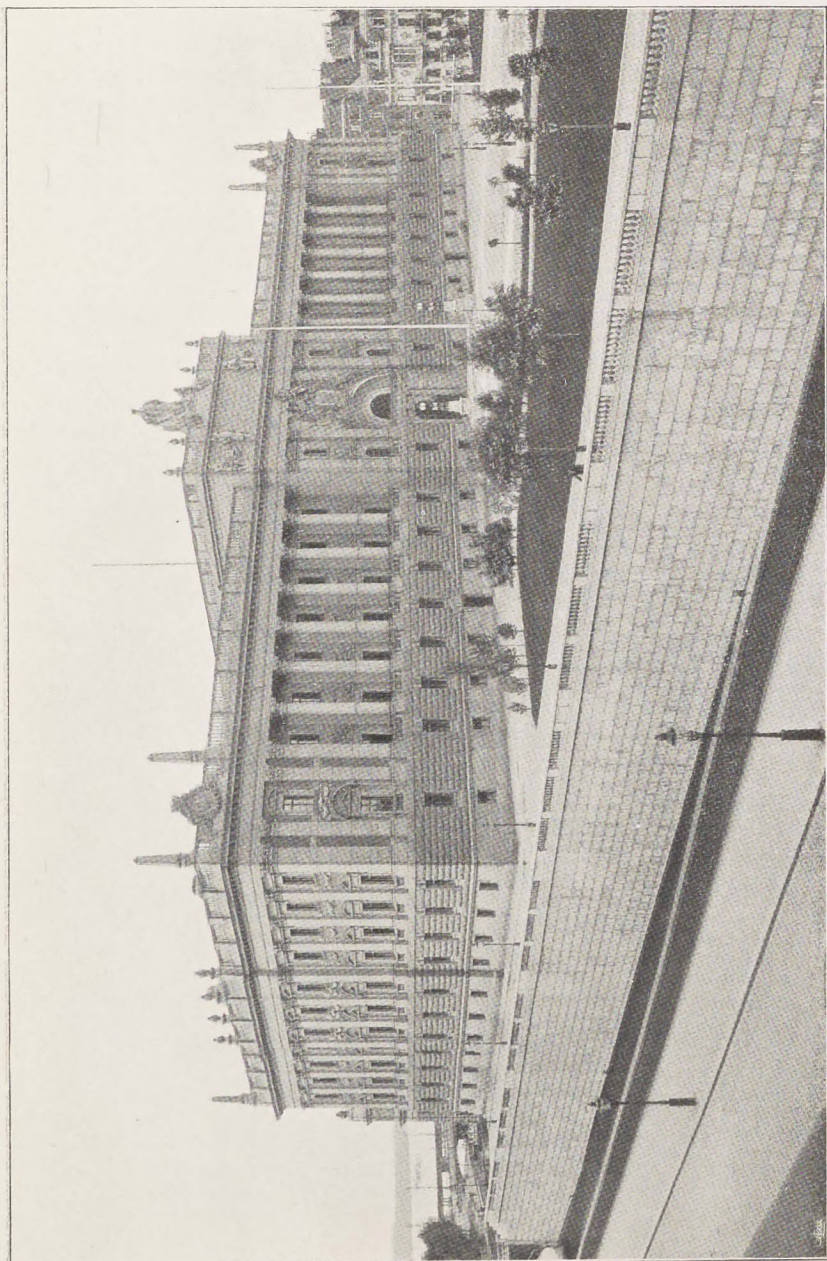
2. PORPHYRY. Blyberg, Elfdalen, Dalarne.  
(»Blyberg-porphyr».)





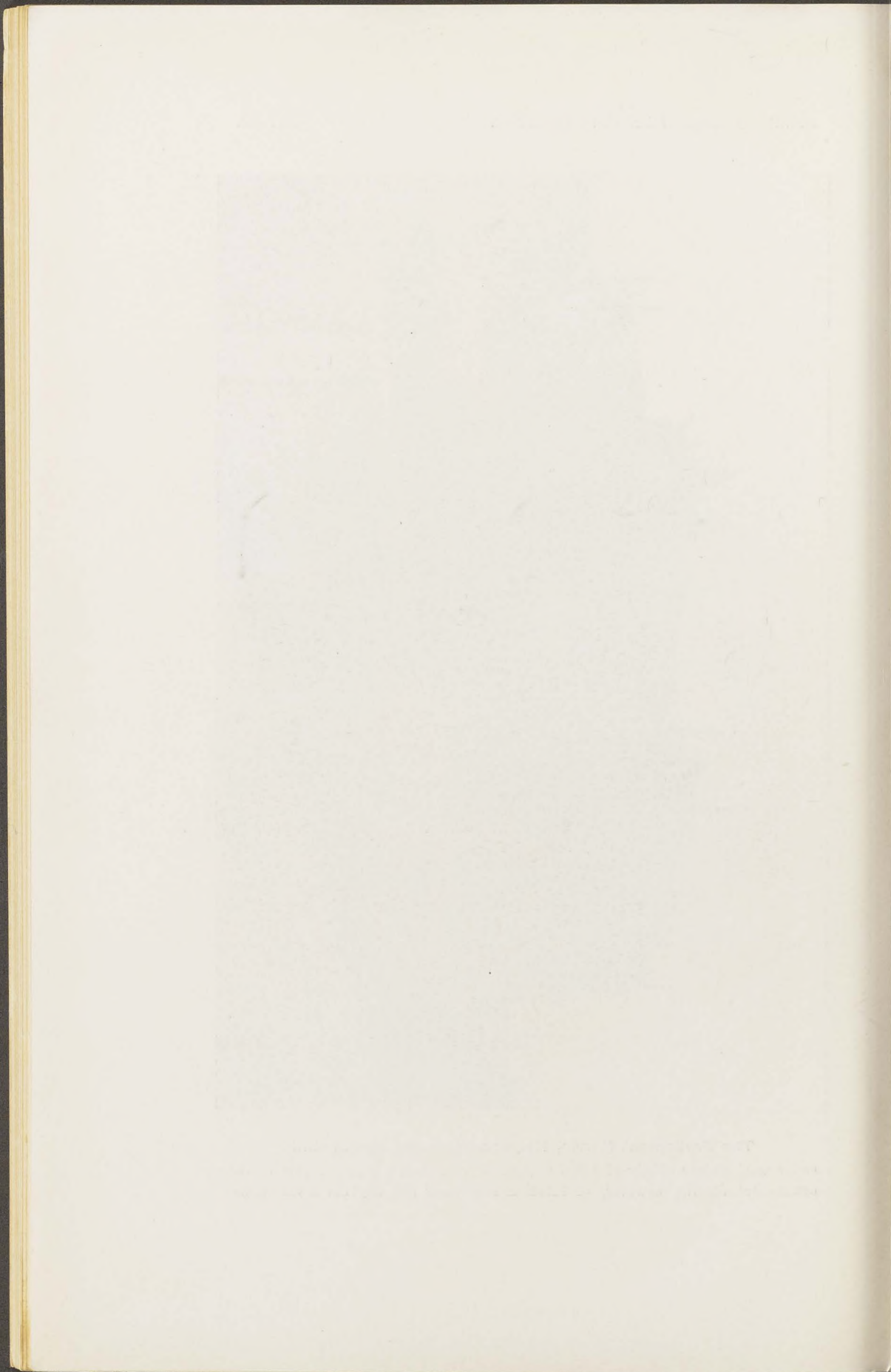
Bohuslän granite-quarry on Malmön off Lysekil,  
illustrating the marked joints of the granite.





The Parliament House, Helgeandsholmen, Stockholm.

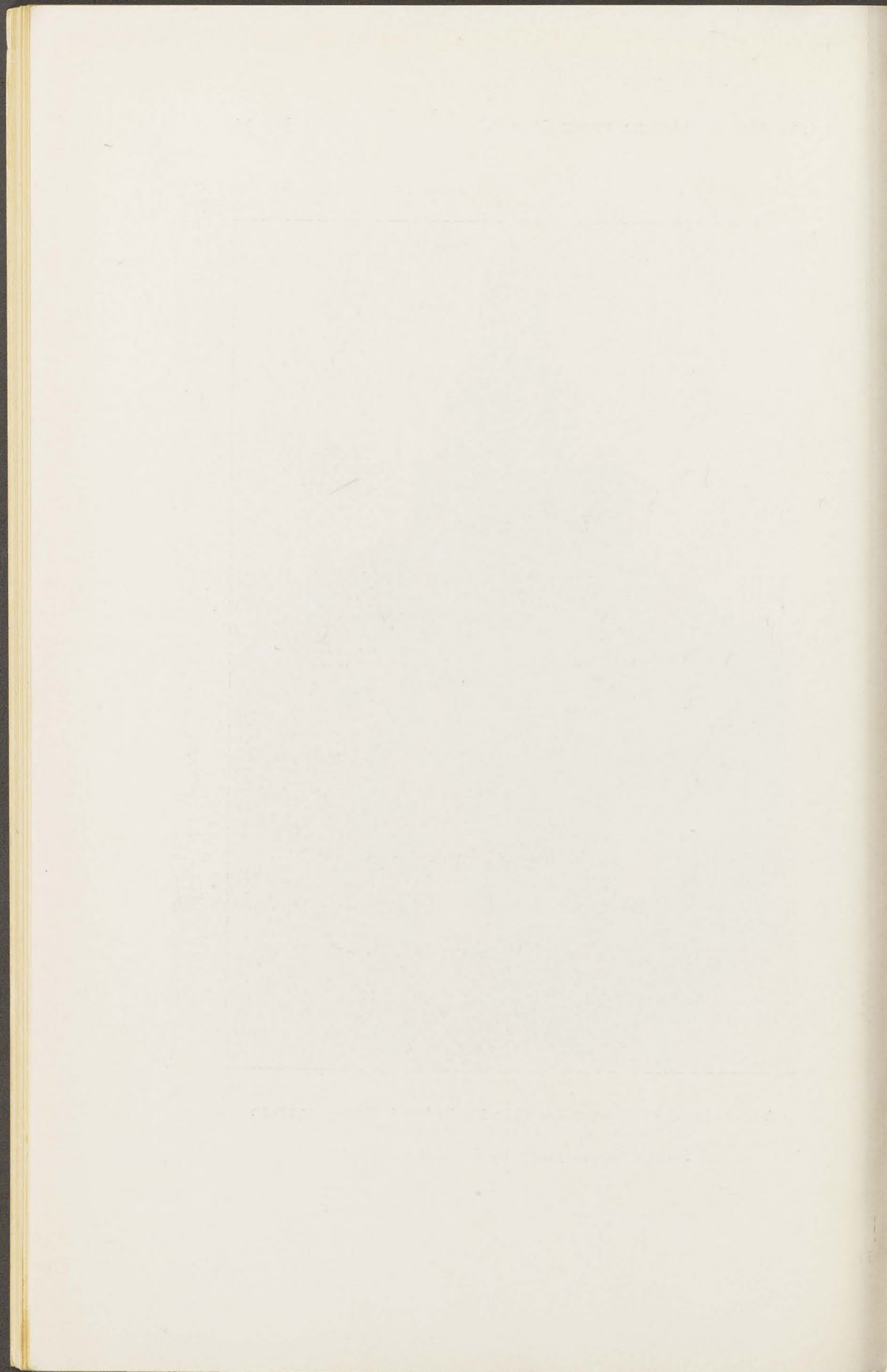
Outer wall linings chiefly of Swedish granites of different types; a part of the ornamental details, however, of Silurian limestones and Algonkian sandstone.

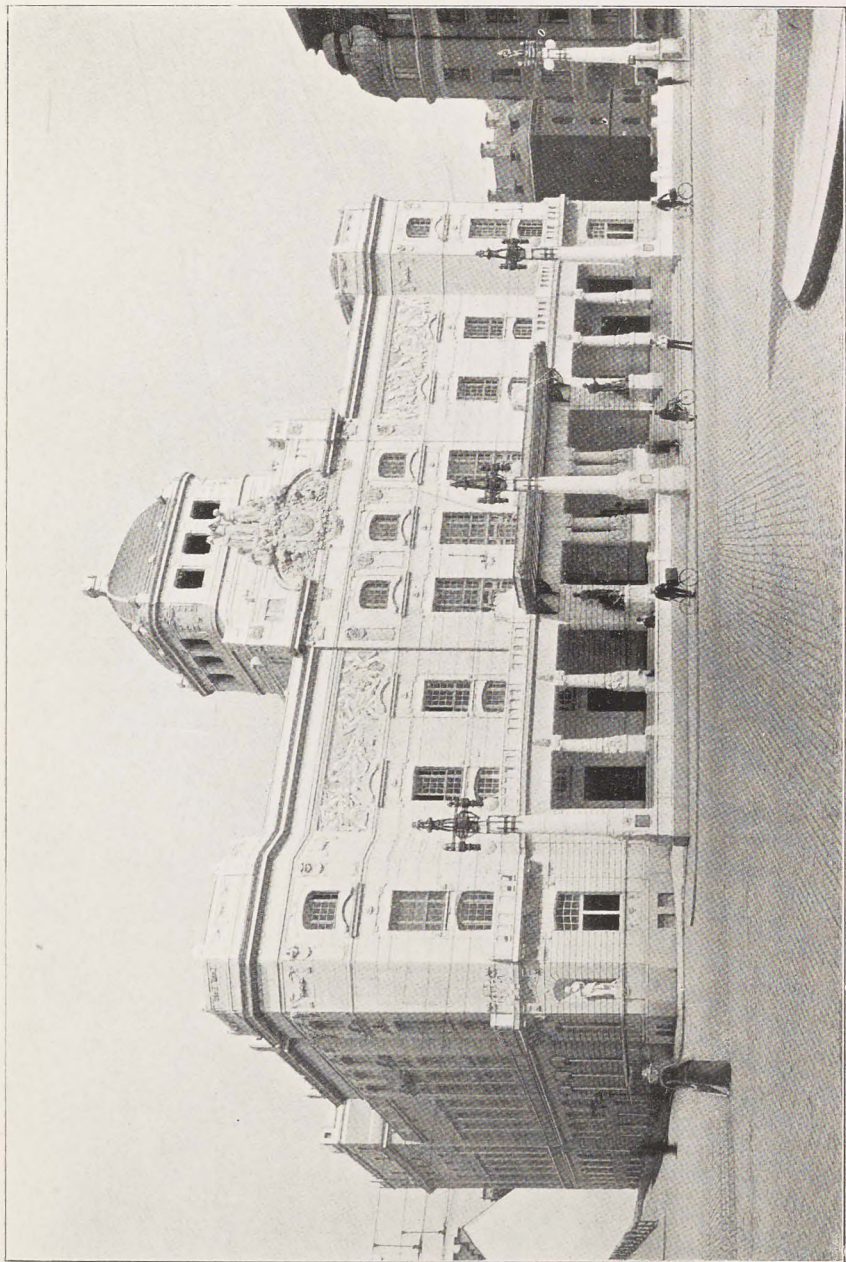




The building of Skånes Enskilda Bank, N:o 5 Drottninggatan  
(corner of Fredsgatan), Stockholm.

Front of reddish-yellow Övedskloster sandstone.





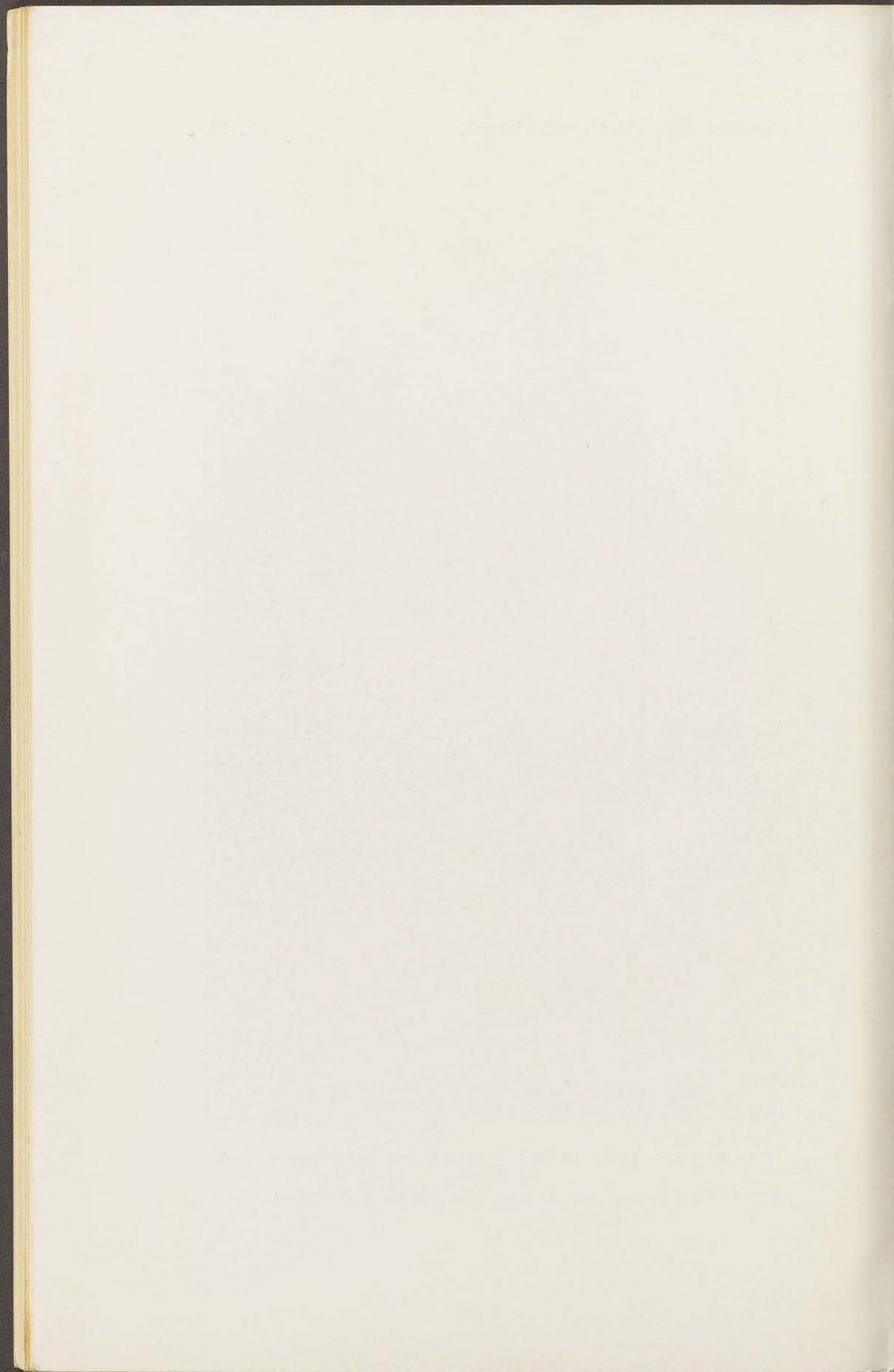
Kungl. Dramatiska teatern, Nybroplan, Stockholm.  
Front of white Ekeberg marble.





The house N:os 74—76 Drottninggatan (corner of Kungsgatan),  
Stockholm.

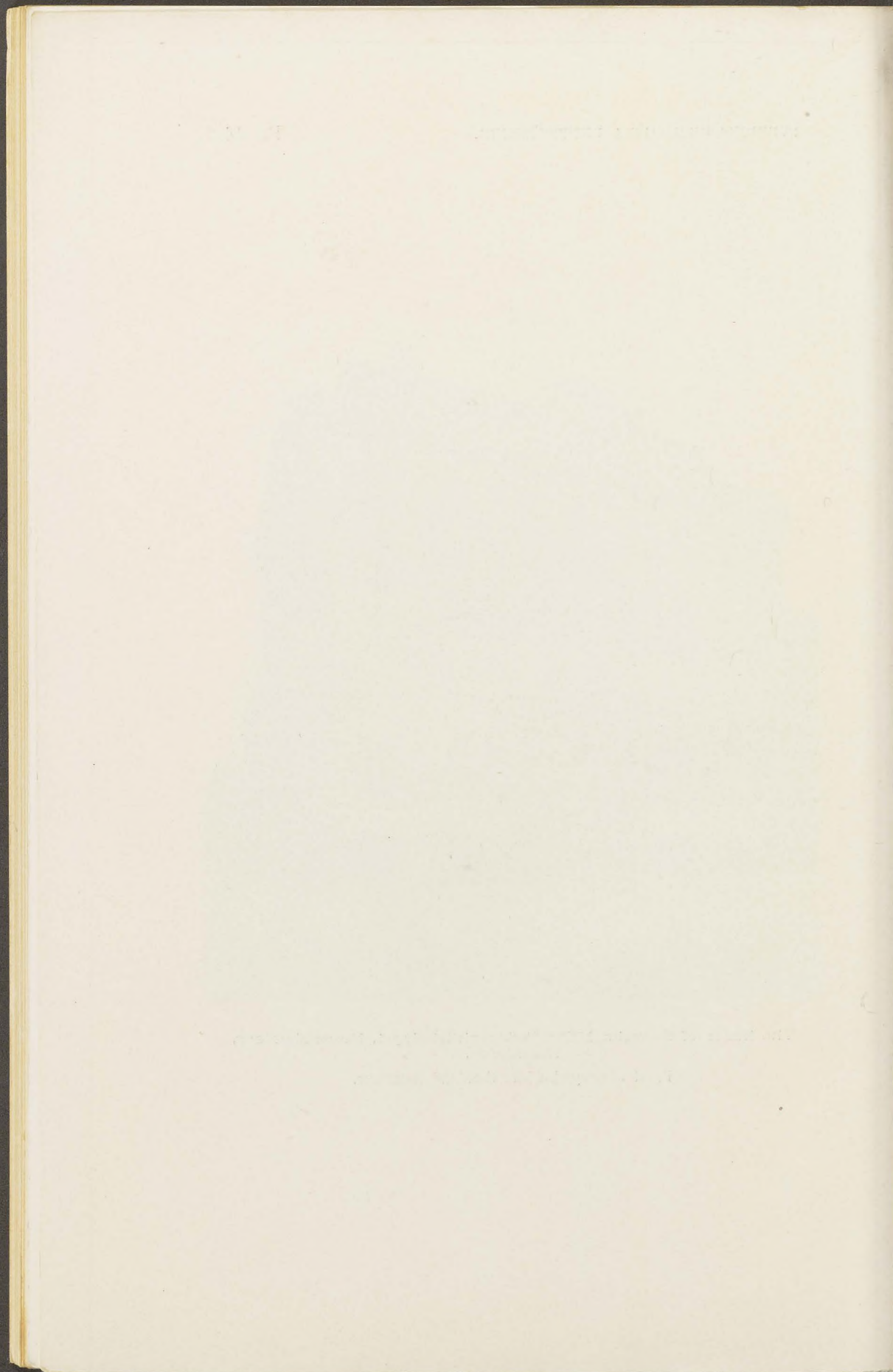
Front of *Orthoceras* limestone from Hellekis, Västergötland.





The house of Svenska Lifförsäkringsaktiebolaget, Norrmalmstorg, Stockholm.

Front of greyish-white Gothland limestone.



# GENERAL MAP OF THE MOST IMPORTANT STONE-INDUSTRY DISTRICTS IN SWEDEN

by  
HERMAN HEDSTRÖM

